	PROPOSED CIVIL WORKS AT VOI 132/33 KV SUBSTATION BILL OF QUANTITIES				
ITEM	DESCRIPTION	UNIT	0.57		
		UNIT	QTY	RATE	AMOUN
	SECTION. 1				
	Preliminaries				
Α	Allow for a temporary site office ,notice board, shelves and , store for materials and tools storage. To accomodate 7 people and all furniture and meeting accesories	ITEM	1		
В	Allow for clean water for the works	ITEM			
С	Allow for all the necessary statutory approvals for the worksby relevant county authorities; Replication of drawings to required formats by county government; Endorsement by relevant proffesional persons; and submit a set of approved drawings before commencement, including site registration.	ITEM	Ì		
С	Allow for temporary sign post for the proposed works	ITEM			
D	Allow for security and insurance for the proposed works				
	who seeding and insolutive for the proposed works	ITEM	-1		
E	Allow for supply of power connection for use for the works	ITEM	1		
F	Allow for a qualified personel conservant with Kenya Power safety regulations for the entire contract period; with capacity to receive safety permits and double up a ssafety officer	ITEM	1		
	Allow for prompt communication and updates facilitation to client supervision team including communication and project data storage, 2 no laptops, 2 no hard drives, airtime etc	ITEM	1		
Н	Allow for demolition of existing control room and cart away	ITEM	1		
_	All C				
	Allow for removal of existing fence and gates and handover to client for disposal	ITEM	1		
		_			
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ITEM		UNIT	QTY	RATE	AMOUNT
_	SECTION. 2				7.7.110 0111
	SWITCHYARD REHABILITATION & REINSTATEMENT				
1_	Switch vard 4000 SM				
А	Clear working area of all the site of existing ballast and rubbles	ITEM	1		
В	Scoop loose top soil by cutting average 400mm deep to	SM	4,000		
	recieve imported fill				
С	Provide average 300 mm thick selected well compacted imported murram fill, compacted in layers of 150mm thick using a plate compactor to achieve slope	СМ	1,000		
D	Prepare and apply Gradiator 4TC or equal and approved insecticide to surfaces of blinding as per Manufacturer's written instructions	SM	4,000		
E	Apply suitable weed killer, herbicide to surfaces of blinding as per the Manufacture's written instructions	SM	4,000		
F	1000 gauge polythene or other equal and approved membrane laid on compacted and treated quarry dust with welted laps of 200mm wide.	SM	3,500		
G	Supply and spread uniformly 150mm thick 'one inch' (1") ballast in switch yard to match existing-re use existing ballast wher not sufficent top up with new supply	SM	3,500		
Н	precast concrete chanel 200mm high at the ballast perimeter to prevent ballast spill over as restraint	LM	600		
I	allow for making good all plinths with worn out edges and apply cement slurry with brush to look good	ITEM	1		
3	Cable ducts				
Α	Supply and install 150mm diameter medium gauge PVC pipes as ducts, with and including 150mm thick concrete class 20 surround and murrum compaction underlying pipe bases as per as per engineer's detailed drawing-in all locations; include curring and reinstatement of existing bitumen road	LM	160		
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TEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	SECTION 4				
	DRAINAGE WORKS				
Α					
Α	PERIMETER OPEN DRAIN				
				-	
	Excavate on site drain trench not exceeding 1.5m deep including plucking and struting, dispoasl of soil to receive drainage channels and forming sloping sides in well compacted murram bed. (hydraulic depth 1m, Trapezoidal area 0.9sm)	LM	200		
	Lay (600mm) dia precast concrete invert block drains to a suitable fall with grooved edge and tounged joints filled with cement/sand mortar (1:3) and laid on 50mm thick plain concrete bed 100mm	LM	200		
	Supply and lay on sides of sloped trench (75x230mm wide) precast concrete slabs jointed in 1:3 cement sand mortar,including proper joint treatment with waterproof Mortar	SM	600		
- 1	Extra over for allowing inlet openings from collection chambers 150mm with PVC pipe, all including surface treatment and joint sealant max 40 inlet ponts	ITEM	1		
В	MAN HOLES				
	Drop Manholes 600 x 600 x avrg 450mm deep (Internal) comprising: 1000 x 1000 x 150 mm thick mass concrete Class 20 base: 150mm Solid concrete block walls: 150mm Thick VRC Class 20 top slab/or cover; with heavy duty meshed/grilled manhole cover: 12mm internal render to base and walls: including step irons: all necessary excavation, disposal and formwork, with outlet PVC pipes as per type A or B across the sitchyard terminating to the open drain max 10 no chambers,	ITEM	1		
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TEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
<u>D</u>	STORM INTERCEPTER CHANEL				
	TWIN RCC chanel 600mm deep 250mm wide ;200mm thick	LM	8		
	walls with 12mm steel bars at 150mm spacing with 8mm				
	binders at 150mm ;overlying a concrete base 150mm thick				
	with smooth finishes; groove 50mmwith angle edge nosing with			1 1	
	grating heavy duty made of 25mm twisted bar on a 50x50			1 1	
				1 1	
	angle franming perfectly fitting the groove				
	150mm Thick P.V.C HD Stormwater drainage pipe including	LM	100		
	excavation not exceeding 500mm deep (average 4500mm)			1 1	
	and backfilling to approval. Starting and termnating at			1	
	manhole chambers to all switchyard manhole drain pits				
E	SOAKPIT-DIAMETER 1200mm				
a	Excavation and cart away 0-3m	LM	3		
b	Excavation and cart away 3-6m	LM	3		
С	Excavation and cart away 6-9m	LM	3		
d	Excavation and cart away 9-12m	LM	3		
e	Excavation and cart away 12-17m	LM	5		
		EIV			
	Allow for construction of masonary blocks minimum 1,2m top	ITEM	1		
	depth and covering with RCC slab 150mm thick with 12 mm steel at 150mm spacing including all provisions for concrete ,steel and builders work				
	Connection and termination of all incomming storm water with ogees and drain pipes	ITEM	1		
	REHABILITATION WORKS				
	Rehabilitate existing trenches by hacking all edges ,making	- 1	050		
	150x300mm grooves at 500mm spacing, and casting lean concrete in 1/2" Inch concrete class 20 and raise level by average 300mm; including all formwork and steel anchoring	LM	250		
	Dolombilitanto ovietio e Turre forma forma forma de Constitucio de la Constitució de				
	Rehabilitate existing Transformer foundation and oil containment and this to include 600mm deep 150mm RCC wall at the perimeter not exeeding 50lm with 10mm steel at 200c/c including concrete floor 150mm with NIRU finish all excavations, formwork and building works; with main block extension to 5m x3,5m for new TX(INCLUDING ALL CONCRETE	ITEM			
	UPGRADE WORKS)				
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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	CABLE TRENCH				
	Trench 600mm wide x600mm deep-length260 Metre various				
	locations				
Α	BULK excavation for trench 1.8m wide from reduced level not	СМ	600		j
	exceeding 1.2 m deep.				
В	Load, cart away from site excavated materials and dispose at	СМ	500		
D	areas designated by local authority.				
С	Fill in and ram selected backfill materials around trench.	СМ	100		
	Trench bed	-			
D	50mm plain concrete(1:4:8) blinding on cable trench bed 1.5m wide	SM	260		
	Vibrated reinforced concrete class 20/20 1:2:4/20 as described in:				
Е	In 150mm thick trench base with smooth steel finish	СМ	40		
F	In 150mm thick vertical walls	CM	50		
	fairface form work to	CIVI	30		
G	Sides of trench wall	SM	650		
	Steel reinforcement bars including tying bending spacer				
	blocks tying wires and fixing high tensile bars to BS 4461				
T	Y 8mm in cable trench	KG	2,800		
_					
	Precast concrete trench covers (external cable trenches)				
К	Provide and put in place (1000x300x75mm) thick precast concrete trench covers reinfoced Y8 bars spaced at 100mm both ways with handles for lifting; with all edges protected with angle section 25x25mmx3mm	NO	900		
-	Ditto for existing trenches	ITEM	1		
	Difform existing frenches	II EIVI			
_	Demolish and cart away existing damaged covers	ITEM	1		
	Cable trays				
	Fabricate and fix cable trays,in 50x50x6mm thick RHS frame WITH 50x50x4mm RHS ties at 300mm c/c welded in themain frame and raised 200mm above the cable trench floor with sime size supports,ALL steel work PAINTED to clients approval with 2 coats and undercoat primer	LM	300		
L	Allow for grooves 300x300mmx600mm deep at 800mm spacing besides the cable trench edge A MAX OF 1.5	ITEM			
-					



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT NO.3	2.4	3,11	ACC AT In	7 9 0111
	OIL sump chamber 6m x 5m x 3m deep; perimeter 200mm thick block walling; internal plaster complete with niru finish; with ring beam at every 2m interval 250x200mm with 4 nos, 12mm bars and 8mm shear links at 200mm spacing; cover slab with manhole opening 150mm reinforced with 8mm steel bothways at 150mm spacing; heavy duty steel cover; including pvc pipe 4"connecting with the main transformer pit	ITEM	1		
	not exceeding 6m away,-in two compartments				
	Allow for connection to soak pit	ITEM	1		
	ROAD REHABILITATION				
	ACCESS ROAD				
2	Pavina blocks (Access road)				
A	Excavate for 5m wide access road depth not exceeding 750mm and cart away the spoil	СМ	800		
В	Average 300mm thick selected well compacted hardcore fill, compacted in layers of 150mm thick using 10 tonne vibrating roller to receive paving blocks	СМ	800		
С	300mm approved compacted murram fill in 150mm layers	СМ	350		
D	50mm thick approved and well compacted quarry dust blinding on hardcore	SM	1,100		
E	Heavy duty industrial concrete paving blocks size (210x105x80mm) minimum strength 49N/mm square laid to slope on quarry dust and compacted	SM	1,100		
F	125 x 250mm splayed kerb to BS 340 including 125 x 100mm channel ton and including concrete Class "E" foundation and 100mm haunching to back of kerb including all necessary excavation, formwork and disposal	LM	500		
G	Ditto but curved	M_	70		
- 2	Darlinklin or				
3	Painting	-+		-	
A	Prepare and apply approved gloss paint to kerbline; 125mm girth; colour to engineer's approval	LM	570		
	TOTAL THIS PAGE				
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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	GATE		325—33		
	Fabricate and fix a primary substation gate as per DRAWING	NO	1		
	the consisting of 75x50x8mm mainframes and 50x50x3m	1 1			
	intermidiate members and bracings with small wicket	1 1			
	openable door 1m wide with closing latches 14 gauge plate;	1 1			
	including gate columns ,fastening,assembly and all works	1 1			
	6mx2,0m				
	Extra over for painting with cooperate colours and logo	ITEM	1	+	
		11 [] 4 (
	Rehabilitate existing gate by checking all connections, bushes	ITEM	1		
	and priming with 3 coarts of paint and hand over to client for				
	re use				
	ELEMENT NO 4				
	ELEMENT NO.4 CONTROL BUILDING	-		-	
-	Substructure				
		C) (170		
а	Excavate oversite vegetable soil average depth 150mm	SM	170		
	and carf awawy				
b	Excavate for foundation trench 1m wide commencing	СМ	100	-	
	at reduced level and not exceeding 1.5m deep,	CIVI	100	_	
	arroaded level and her exceeding filem deep	-		+	
С	Ditto exceeding 1.5m but n.e 3m.	СМ	100	+	
d	Excavations for column base size	CM	40	1	
		OIVI	40		
е	Ditto exceeding 1.5m but n.e 3m.	CM	40		
f	Extra over excavation for excavating in hard rock.	CM	5		
			1	-	
h	Allow for keeping all excavations water free by pumping,	ITEM	,		
	bailing or otherwise.				
ii	Fill in and ram selected imported materials around	СМ	335		
	foudations and column bases.				
			80		
J	Load, cart away from site surplus excavated materials and	CM			
_	dispose at areas designated by local authority.				
_			50	-	
k	300mm thick bed of selected hard-core well-compacted	СМ	50		
	in layers n.e. 150mm thick blinded with fine material	CIVI			
	50mm thick to receive damp proof membrane (m.s)	-			
	The state of the s				
Г	150mm thick approved murram blinding well compacted,	SM	160		
	watered and rolled to satisfaction			-	
m	Gradiator 4TC or equal and approved insecticide	SM	160		
	treatment to hardcore blinded surface and around entire	3	, 55		
	building				
	building TOTAL THIS PAGE	-			
	IIOIAL INIS FAGE				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
_					
- n	1000 000 000 000 000 000				
n	1000 gauge polythene or other equal and approved	SM	160		
_	mebrane as damp proof laid on blinded hardcore.(m.s)				
_	with welted laps of 200mm wide.			-	
0	50mm thick plain concrete(1:4:8) blinding under strip	61.4	1.10		
-	and columns foundations.	SM	148	-	
	and colorn is roof adiloris.			_	
				-	
	Vibrated reinforced concrete class				
	20/25 1:2:4/25 as described in:	+			
р	Strip foundation (600x250)mm	СМ	15		
		Civi	10		
_ q	Column bases size (1250x1250x250)mm	СМ	10		
			- 10		
r	Columns size (250X250)mm	CM	9		
S	plinth beam 300 x 200	CM	5		
	150mm thick concrete slab on damp proof	CM	25		
	membrane (m.s)				
	Steel reinforcement bars including tving bending				
_	spacer blocks tving wires and fixing high tensile				
	bars to BS 4461 to strips, columns and bases Y8-16mm				
U	10-10(1)(1)	KG	2600		
У	Steel wire fabric mesh reinforcement to B.S.4483 Ref	0).1	1.40		
y	BRC No.A142 in concrete bed (M.S) including 200mm	SM	160		
	laps, all necessary tying wire and supporting as			_	
	required.				
	Sawn formworks to				
aa	Sides of column size 250 x 250 mm	SM	50		
ob	Sides of floor slab 150-200mm girth.	LM	55		
	Sides of plinth beam 300x200	SM	36		
_	Foundation walling		0		
CC	225mm thick approved natural stone walling bedded	SM	245		
	and jointed in mortar (1:3) UP TO 1 m above ground				
		1			
_					
		+			
	TOTAL THIS PAGE	+			



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
_		-			
	ELEMENT NO.6	1		_	
	SUPERSTRUCTURE	1			
1	Walling	1			
a	Pluvex No.1 or other equal and approved bituminous	LM	110		
u	damp proof course to B.S.743. 225mm wide under	LIV!	110		
_	walling (m.s) including for 200mm long laps	_		-	
_	(measured net no allowance included for the laps)			-	
	005 made think were recorded to the first the second of th	011			
b	225mm thick approved smooth hand dressed natural	SM	480	-	
	stone walling in cement mortar (1:4) including for				
	hoop iron in every alternate course.			1 1	
	DDIA (INIC all adaptate de la lateratura de lateratura de la lateratura de			-	
	PRIMING all elevated substructure masonary surfaces with			1 1	
_	black bituminous paint 3 coats				
_	Vibrated reinforced concrete class	+		 	
_	20/25 1:2:4/25 as described in:	+			
С	In columns size 250x250mm	CM	,	-	
C	III COIOITINS SIZE ZOOXZOOTIIN	CM	6	-	
d	In ring beam and upstand size 450-600x200mm	СМ	22	 	
	ir thing beam and opsiding size 450-6500x200mm	CM		1	
е	In 150mm thick suspended slab	cm	25	1	
	III TOOTHIT KIIOK SOSPO,TOOD SIAD	Cili	20		
f	In 100mm thick canopies over all openings and hood	cm	2		
			A.		
g	In lintols 300x200mm	СМ	2	1	
	Steel reinforcement bars including tying bending				
	spacer blocks tying wires and fixing high tensile				
	bars to BS 4461 in upstands,ringbeam and slab,canopies				
	Y 8mm-16MM	KG	5170		
	T OTHER TOWARD	T NG	3170	-	
	Sawn form work to			1	
q	Sides and soffits of ring beam	SM	280	1	
	sides and somis of fing beam	2141	200	1	
r	Sides of columns	SM	90		
	oldes of colornis	3/11	70		
S	Soffits of suspended slab	SM	160		
	domino di posportada siab	3141	100		
+	canopies and the like	SM	12		
		5,11	12		
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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT NO. 7				
	ROOF CONSTRUCTION AND COVERING				
1	The following in 7 no trusses spanning 11.00m and hoisted 4m high above finished floor level	-		-	
	100x50x6mm rolled steel RHS in rafters	1 122	1.00		
а	100x30xortim folied steel kins intraffiels	LM	160	-	
b	Ditto 50x50mm in struts	LM	180		
С	Supply and fix in concrete ring beam 28no.	ITEM	1		
	16mm bolts	115/01		-	
	TOTALLY SOLICE	1		1	
d	(200x200x6mm thick M.S plate cleats with 2no. holes	NO	14		
	welded to truss.	110	17	1	
				1	
е	Supply and erect MS purlin cleats welded to truss at	NO	14	1 -	
	1800 cc	1 ,,,			
		1 1			
f	Supply and erect 150x51x2mm Z purlins bolted to	LM	170		
	rafters primed with one coat of red oxide	- LAN	.,,		
		1 1		1	
g	Gauge 26 pre-painted IT 5 roof covering sheet including	SM	196		
_	for 2no, side corrugations and 300mm long end laps	1	.,,		
h	Ditto for side cladding AND UNDERSIDE AND GABLES GIRTH	SM	150		
	not less than 2m with 600mm eaves		.00		
i	26gauge matching ridge cap.	LM	35		
İ	50x50x6mm RHS fascia support	LM	78		
k	50x50x6mm angle iron fascia support	LM	150		
	Supply and fix cleats welded to fascia support	NO	33		
m	26 gauge 100x100mm corner edging	LM	112		
n	14 gauge galvanised M.s in gutters	lm	54		
0	Extra over for stopped ends	NO	4		
р	Ditto for 100mm outlet	NO	6		
q	50x50mm thick timber bearers	LM	65		
r	100x50mm thick timber comice	LM	65		
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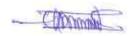
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
-	Davis who as				
	Down pipes	1			
S	100mm down pipes 24 gauge secured to wall with	LM	48	1	
—	brackets at 900mm c/c				
1	E.O for swan neck	NO	12	-	
	2.0 TO: SWAIT HOCK	I NO	12		
U	Prepare surfaces, prime and apply two coats of first	ITEM	1	_	
	quality aluminium panit to all rainwater goods	1		\vdash	
	ELEMENT NO.8				
1	Windows				
	Composite purpose made powder coated alluminium				
	windows off whiete arev				
	to client's approval.				
а	ALLUMINIUM SLIDING size (1200 x 1500mm) high	NO	10		
	overall				
С	Window size (450 x 600mm) high	NO	6		
	overall-top hung				
	Descri				
-	Doors Paragraph of the Control of th				_
	Purpose made steel casement double leaf door divided				
-	into equal leafs made out of 75x50mm frame with four permanent louvred ventillation made from (25x3mm)	-			
	flat bars whole door hinged to and including	-			
	(100x100x6mm) anale line built to wall				
	with bracketsin sizes	-			
	NOTE: All external doors to be as per provided				
	drawing SK No. 06249 Sheet 1-all steel galvanized to 85 micron				
	and the galvainzed to 65 filleron				
h	Door size (1800x3000mm) double leaf	NO	2		
_ i	Door size (1000x2500mm) single leaf leaf	NO	2		
j	alluminium intenal doorsDoor size (900x2500mm)single leaf	NO	6		
	with fan light				
V	Allow for priming all metal and flash doors surfaces and	SM	173		
	apply two coats of 1st quality paint to all doors				
	and frames				
	<u>FINISHES</u>				
	Floor finishes				
а	25mm thick cement sand screed prepared to receive	SM	120		
	granolithic paving.				
b	Ditto for ceramic tiles	SM	58		
С	terazo paving to wood floated floor screed including	SM	150		
	all the necessary strips				
d	100mm skirting ditto	LM	90		
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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	10 (1) Listing a partition of a property	142	920		
е	12mm thick internal quality lime plaster finished smooth with steel trowel to all walls and suspended slab	SM	920	-	
	WITH Steel Hower to all walls and suspended stab				
f	External plaster with 12mm render including profile pointing on	SM	250		
	stone jopint				
g	Prepare surface and apply undercoat and 3 coats of 1st	_ SM	1300	-	
	quality silk vinyl emulsion paint to plastered walls internally				
	and externally.				
	and externally.				
h	12mm plaster to window and door head, cill and jambs	LM	88		
	200-300mm girth			-	
	Decree of let quality	LM	1300	_	
	Prepare surface, apply undercoat and 2 coats of 1st quality silk vinyl emulsion paint to plastered surfaces 200-300mm girth	(L)VI	1500		
	Slik With Etholson paint to plastered sondees 200 000mm girin				
k	200X250mm wall tiles bedded in cement grout pointed in	SM	65		
	colour cement to match colour of tiles	\vdash		-	
_	Ditto 300x300mm floor tiles	SM	69	+	
	DITIO 300X300MM HOOF lifes	SIVI	- 07		
2	Kitchen				
а	100mm thick 1:2:4 concrete in kitchen work top	SM	6		
b	Y 10 reinforcement bars at 200 C/C	KG	230	-	
	1.50mm block wall	SM	23	+	
С	130mm plock wdii	UNIT			
d	12mm 1:3 cement sand plaster	SM	69		
е	Single drain single bowl stainless sink	NO	l		
		NO	1		
f	Bricon or approved kitchen mixer	NO		1	
g	400mm wide 25mm thick block vineered offwhite cream	LM	35		
9	board shelves fixed				
	with brackets to wall				
		1	0.5	-	-
h	Ditto in locable cupboards including hinges, fasteners	LM	35	1	
	and locks -colour scheme subject to eng approval to blend				
	with off white grey terazzo	_			
	600x600mm PCC paving slabs along control room perimeter	SM	100	#	
	and spalash aprons and all other areas stipulated by eng				1
	including bedding and jointing with 1:3 mortar				1
	A				1
		NI		+	+
	Allow for panic locks in external DOORS	No	44	+	+
_	TOTAL THIS PAGE				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	ELEMENT NO.10				
1	DRAINAGE AND PLUMBING WORKS				
- 7	Plumbing works Twyfords Hindustan vitreous china wash hand basin size	110		-	
а	500x400mm fixed on semi-concealed brackets	NO	2		
	300x400mm fixed on semi-concedied brackers	-		-	
b	Ref. No. 1200 complete with 2No. Approved 12mm	NO	2	-	
~	chrome plated taps	110		-	
С	150x150mm semi- recessed "Twyfords" white toilet roll	NO	2		
	holder	1			
d	White Twyfords classic WC suite comprising	NO	2		
	pan, heavy duty plastic seat and cover, ceramic cistern,				
	flush pipe and trap.				
е	Supply and fix compact auto dryer satin chrome	NO	2		
	2.2KW				
f	12mm gate valve as per peglar	NO	12		
g	Ditto 15mm		9		
_	15				
h	15mm class B pipes including all necessary fittings	LM	200		
_	including all the necessaary excavations and chasing in wall	-		-	
-	chasing in wall	-			
-	12mm class B pipes including all necessary fittings	LM	210	_	
_	including all the necessaary excavations and	LIVI	210		
-	chasing in wall	-			
		_			
j	allow for repair to good condition the entry chanel at gate	ITEM	1		
	1200x800mm resin stone shower tray 40mm CP unslotted	NO	1		
	waste and trap				
	100mm CP metal shower head , 15mm CP angled shower arm	NO	1		
	,15mm riser pipe,exposed shower mixer valve.				
-	Somi countarion wash basins with tan halo and all air star.	NO	0		
	Semi-countertop wash basins with tap hole and chain stay 32mm chrome plated bottle trap waste etc.	NO	2		
	1800 x 500mm single drain double bowl sink c/w 1No. 15mm	NO	1		
	dia. CP mixer pillar tap with swivel spout, 2No. 40mm waste	140	ı		
	and of mixer plant rep with swiver speed, 2110. 40th in waste				
	Vitreous china semi-recessed toilet roll holder	NO	2		
	1000x600x6mm thick plate glass mirror with bevelled edges.	PC	3		
	Soap dish.	NO	1		
	Towel rail.	NO	1		
	TOTAL THIS PAGE				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
-	COAKDIT				
	SOAKPIT	-			
	Excavate soakpit 1800mm dia to seepage depth min 15m,equip and construct protective wall and cover including all builders work,concrete and steel work-TYP	ITEM	1		
_	SEPTIC TANK				
	Septic tank 3.6m x 2.1m x 3m deep; perimeter 200mm thick block walling; internal plaster complete with niru finish; with ring beam at every 2m interval 250x200mm with 4 nos.12mm bars and 8mm shear links at 200mm spacing; cover slab with manhole opening 150mm reinforced with 8mm steel bothways at 150mm spacing; heavy duty steel cover; including pvc pipe 4"connecting with the sewerage and foul drainage-in two compartments	ITEM			
	WATER SUPPLY SYSTEM				
	Connect piped water using 1"G.I.class B pipe to the substation by liaising with the relevant water body; including excavation of water pipe water trench, backfilling, all connections and accessories.	ITEM	1		
	Supply and install 6000 litres an approved plastic water tank, approved 3/4" watertap and concrete platform including all nacessary required fittings and connections-GROUND MOUNTED -extra over to include roof water harvesting system with gutters ,PVC downpipes and BENDS	ITEM	1		
	supplity and install 2000lt rectangular tank on top of control building including all float valves, connectoions and maintainance access provision on facia cladding; connect to piped mains and sanitary units	ITEM	1		
_	FI FOTRICAL INICTALL ATIONS WARNING				
A	ELECTRICAL INSTALLATIONS WORKS Electrical builders work to power supply points and distribution board lighting ponts; sockets; incuding chasing and making good all works as described	ITEM	1		
В	Electrical distribution board, Electrical lighting work and accessories, flourescent bulbs, socket outlets, swithes AS Follows 12nos 4feet flourescent lamps; 4 nos ball fittings, 1 6nos 13 amp sockets, cooker unit sockets 1 noo; provision for data and TV cable in all operator room, CCTV with 6 no cameras and VDU in controller room	ITEM	1		
	Supply and install 110 Volts DC distribution board - 12way Rated 100 Amps	ITEM	1		
	TOTAL THIS PAGE				



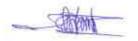
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	SUBSTATION LIGHTING				
С	Supply 240 watt AC (LIGHT DEPENDENT TYPE) bucky head	ITELA		-	
C	floodlight with energy saver 100 watts sodium metal halide	ITEM	4		AMOUNT
	lamps to <u>be</u> hoisted on mast supplied by kplc including all				
	connections			1	
_		NO		-	
)	supply and fix emergency chargeable lights in the control	NO	2		
	room to client approval.			-	
	ELEMENT NO. 7- SMOKE DETECTORS				
Ą	Allow for Hardwired Smoke detectors installations, including a	Item	1	1	
	battery back up; to be carried out by a nominated sub-				
_	contractor-menvier OR approved type				
	Aller for your little land			-	
3	Allow for general attendance on specialist contractor	Item	1		
C	Builder's work in connection with Smoke detector installations,	Item	1	1 1	
	cut away for and attend in all trades on the sub-contractor				
	installing the following points in a mainly concealed system;				
	including chases, holes and recess notching in timber etc; and				
	making good all finishes for cut in boxes, electrical wiring,				
	mounting brackets, smoke detector feeds, fire alarm points				
	etc				
	ELEMENT NO. 8 - AIR CONDITIONING				
	Air conditioning-stand alone				
	Supply and fix air conditioners complete with all fixing				
	accesories to				
	controll room temperartures from approved suppliers				
4	24000 BTU	No	3		
	ELEMENT NO. 9 - FIRE EXTINGUISHERS				
4	Supply and fix controlled discharge 9 litre carbon dioxide gas	No	4		
	fire			D I	
	extinguisher manufactured to BS EN 3-9:2006, Bs 7863:2009, BS				
	5306-				
	4:2001 and the cylinder manufactured to BS 5045 complete				
	with the following:				
	Charge and fixing bracket, Pictorial instructions, Colour				
	code,Servicable on site, discharge horn and hose,Brass hot				
	stamping ,Operating valve,Local Fire Brigade approval				
	I programmy carretain and angular approval				
1	Ditto but DRY powder fire extinguishers	No	4		
3	Ditto fire blanket 6' x 4' container	No	2		
	- Are brankers A i soymanio	110			
c	allow for fume extractor with opening diameter not les sthan	No	1		
	500x500mm including supply of extractor and fix in battery	110		1 1	
	room allow for 60cubic meter volume extraction			1 1	
	and the december moter volume extraction				
	SUPPLY AND INSTALL 420v AC Autochangeover Distribution	No	1 -		
-	Pannel as per specifications attached	140	ı		
	(KP1/6C.1/13/TSP/09/092)				
	(N. 1700.1719/101707/07Z)				
_					
				/	



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	FIFAFAIT NO F				
_	ELEMENT NO.5 CABLE TRENCH			-	
1	Trench (600x600mm deep) length approx.	-		_	
_	60metres-internal	-			
а	Excavate for trench 1.2m wide from reduced level not	CH			
u	exceeding 1.5m	CM	90	_	
	exceeding r.sm				
b	Load, cart away from site excavated materials and	СМ	90		
	dispose at areas designated by local authority.				
С	Fill in and ram selected imported materials around	СМ	46		
	trench	OIM	70		
2	trench walls				
a	50mm plain concrete(1.4:8) blinding on cable trench	C14	70		
<u> </u>	foundation 1.2m wide	SM	72		
_	Vibrated reinforced concrete class				
b	20/20 1:2;4 as described in:	011			
D	In 150mm thick trench base	СМ	9		
С	In 150mm thick retaining walls	СМ	14		
	Character and the				
d	Steel form work to				
a	Sides of trench wall	SM	190	-	
	150mm blockwallas pernanent formwork on outer trench wall	SM	80		
_	Steel reinforcement bars including tying bending				
_	spacer blocks tying wires and fixing high tensile				
_	bars to BS 4461				
С	Y 8mm in cable trench	KG	1550		
	50x50x4mm m/s angles embedded on concrete trench edges	lm	130		
	600x600mmx5mm thick chequered plate trench covers				
q	reinforced with 40x40mmx3mm thick SHS all round	NO	100		
_	primed and apply 3 coats of first quality gloss paint.				
	Cable trays				
	Alluminium perforated cable trays 600mm x40mm complete	LM	60		
_	with all bends, angle turn cleats and screws				
	TOTAL THIS PAGE				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	DEDIAMETED WALLING 2001AA				
	PERIMETER WALLING -300LM (Substructures)				
	Excavate for foundation trench 600mm wide commencing	CM	250	-	
	Executate for footing allow wellen soon any wide container length	CIVI	230	1 1	
	at reduced level and not exceeding 1,5m deep.				
М	extra Excavations for widening column bases size (1.0x1.0)m	СМ	70		
N	Ditto exceeding 1.5m but n.e 3.0m	СМ	23		
	Dino exceeding 1.5m born,c 0.5m	CIVI		1	
0	Extra over for excavation in all classes of rock at any				
	depth.	CM	3		
Р	Load, cart away from site surplus excavated materials and	СМ	97		
	dispose at areas designated by local authority.				
Q	Fill in and ram selected imported materials around	CM	173		
	foundation and columns	1			
R	Provide all the necessary planking and strutting to	ITEM	1		
	uphold sides of trenches.	\vdash			
S	Allow for keeping all excavations water free by pumping,	ITEM	1		
	A water let keeping an executations water need by portiping,	11,514,	,		
	bailing or otherwise.				
T	50mm thick (1:4:8) mass concrete blinding to walling and	SM	240		
_	column bases	\perp			
	Vibrated reinforced concrete class				
U	20/25 1:2:4/25 as described in:	614	100		
-0	Foundation strip size (200x600)mm	CM	180		-
V	Column bases (1000x1000x300)mm	СМ	31		
W	Columns (200x300)mm	CM	25		
Х	Plinth beam 300x200mm	CH	00		
_^	Firm beam 300x200mm	CM	20		
A	Sawn/Steel form work to Vertical sides of column	P14	100		
A B		MS	400		
D	Vertical sides of ground beam Steel reinforcement bars including tying bending	SM	180	-	
	spacer blocks tying wires and fixing high tensile				
	bars to BS 4461				
С	Y 8-16MM	KG	6500		
	225mm thick natural stone substructure walling in cement				
	sand mortar (1:3) including and reinforced with 20 SWG hoop iron in every two alternating course.				
F	225mm thick natural stone wall	SM	450		
G	25mm thick rational stone wall 25mm thick cement/sand (1:4) rendering on plinth area	SM	120		
<u> </u>	finished smooth to receive bituminous paint-400mm high	2141	120		
	TOTAL THIS PAGE				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Н	Allow for and create 100mm diameter weep holes at	No.	100		
	ground level every3.0m centers on masonry/concrete wall				
	and prevent ingress using wire mesh grouted in cement	\vdash		+	
	sand mortar.				
2	Superstructure-Walling	1 1			
	200mm thick machine-cut or fair faced dressed natural or	SM	750		
	approved concrete blocks				
	stone walling in cement/sand (1:4) mortar including 20G				
	hoop-iron in every alternate courses.Internally plastered and				
	external horizontal joints keyed in cement/sand mortar				
	(1:3)				
J	350mm wide pre-cast concrete coping twice weathered	LM	300		
	and twice throated fixed to wall.				
IV.	(000,550)	-			
K	(800x550)mm square concrete coping weathered and	No.	33		
	throated on all sides fixed to double columns.	\vdash			
	(550x450)mm square concrete coping weathered on all	l Na	/0		
	columns.	No.	69		
	COOTHIS:				
М	extra over for key pointing externally	SM	750		
	owner over for key pointing externally	3771	700		
Ν	allow for internal plaster whole wall	SM	750		
3	Expansion Joint				
Ν	40mm thick construction joint in flex cell or equall and	SM	32		
	approved expansion joint and (25x25)mm expedite sealer				
4	Razor Wire				
	Supply and fix Razor Wire at the top of boundary wall	LM	300		
	conforming to the following specifications.		000		
0	Coil size-450mm diameter, Blade profile-ripper razor wire,				
	Stretch factor-maximum of 10m per coil and secured to				
	wall with galvanised steel plates at 1m centers.				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
2	SWITCH YARD PLINTHES 33KV FEEDER BAYS Switchgear Foundation plinthes for the following 33kv KPLC steel Structures, to +150mm on new proposed feeder bay re arrangement consisting of ,12no.33kvA/B switches, 6Nos.CBs plinthes, 18nos.33kvCTs, 3nos. 33kvVTS & 7nos. 3no. terminal post insulator-2 leged; 5nos.auto reclosers, 5 no take off poles, as per the General arrangement drawing(GA) and all to structural engineers detailsTotal 74 no.plinths				
F	Excavate foundation pits commencing from reduced level	СМ	170		
G	but not exceeding 1.5 m deep Ditto but not exceeding 3.0metres	CM	170		-
	·				
H	Backfill and ram selected excavated material around foundo Cart away surplus excavated materials from Site to municipal council desiganated damping site.	CM CM	190 90		
	Disposal of water and Strutting	ITEM	1		
J	Blinding mix (1:4:8 - 50 mm)	SM	77		-
Κ	Class 25(20) in foundations Bases	СМ	34		
L.	Class 25(20) in stub col bases with face finishes	СМ	70		
М	steel 8 to 12mm to bases and column	KG	5000		
N	Shuttering to columns stubs	SM	340	1	
0	Edges; 75 to 300 mm to plinths	LM	310	1	
Р	grouting bolts /inserts and the like by holding in position when pouring concrete not exceeding 600mm long-bolts supplied by client	NO	296		
Q	13mm thick plaster (1:3mix) to top surface of foundations with smooth finish trowelled	SM	95		
R	Attendance for KPLC staff to do earthing before all blinding including security for all copper strip edges	ITEM	1		
A	supply and install 32mm heavy duty PVC flexible conduit	ITEM	1		
	fastened on switchgear plinth reinforcement to lengths not exceeding 5.0metres in every plinth and to flush with finished plith level for earthing conductor.				
				-	
	TOTAL THIS PAGE				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
2	SWITCH YARD PLINTHES 132 KV & LILO SWITCHGEAR				
	700x700mm				
	Switchgear Foundation plinthes for the following 132kv steel				
	strujctures, to +150mm on new proposed LILO re arrangement consisting of ,5no.132kv ISOLATOR, 4Nos.CBs plinthes,				
	12nos.132kvCTs, 6nos. 132kvVTS & , 3no. STAND ALONE post				
	insulator-1 leged; 6nos.CVTs, 3 no SDs, as per the General				
	arrangement drawing(GA) and all to structural engineers				
	detailsTotal 70 no plinths	014	1.65		
F	Excavate foundation pits commencing from reduced level but not exceeding 1.5 m deep	СМ	165		
G	Ditto but not exceeding 3.0metres	СМ	165		
K	Backfill and ram selected excavated material around founds	СМ	61	+	
Н	Cart away surplus excavated materials from Site to municipal	CM	104		
	council desiganated damping site.				
I	Disposal of water and Strutting	ITEM	1		
J	Blinding mix (1:4:8 - 50 mm)	SM	77		
K	Class 25(20) in foundations Bases	СМ	34		
L	Class 25(20) in stub col bases with face finishes	СМ	70		
М	steel 8 to 12mm to bases and column	KG	5000)
N	Shuttering to columns stubs	SM	340		
0	Edges; 75 to 300 mm to plinths	LM	310		
Р	grouting bolts /inserts and the like by holding in position when	NO	280		
	pouring concrete not exceeding 600mm long-bolts supplied				
	by client				
Q	13mm thick plaster (1:3mix) to top surface of foundations with	SM	90		
	smooth finish trowelled				
R	Attendance for KPLC staff to do earthing before all blinding	ITEM	1		
	including security for all copper strip edges				
A	supply and install 32mm heavy duty PVC flexible conduit	ITEM			
^	fastened on switchgear plinth reinforcement to lengths not	11 =1~(ı		
	exceeding 5.0metres in every plinth and to flush with finished				
	plith level for earthing conductor.				
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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
2	SWITCH YARD PLINTHES 132 KV & LILO SWITCHGEAR GANTRIES 1.5X 2.0M				
	Switchgear Foundation plinthes for the following 132kv gantry steel structures, to +150mm on new proposed LILO re arrangement consisting of ,1no.132kv TERMINAL GANTRY, 2Nos. 132 KV TENSION LINE GANTRY, 2nos.132kv BUSBAR ASSEMBLY, General arrangement drawing(GA) and all to structural engineers detailsTotal 10 no.plinths				
F	Excavate foundation pits commencing from reduced level but not exceeding 1.5 m deep	СМ	80		
G	Ditto but not exceeding 3.0metres	СМ	80		
K	Backfill and ram selected excavated material around founds	СМ	105		
Н	Cart away surplus excavated materials from Site to municipal council desiganated damping site.	СМ	55		
	Disposal of water and Strutting	ITEM	1		
J	Blinding mix (1.4:8 - 50 mm)	SM	50		
K	Class 25(20) in foundations Bases	СМ	5		
L	Class 25(20) in stub col bases with face finishes	СМ	50		
М	steel 8 to 16mm to bases and column	KG	3000		
Ν	Shuttering to columns stubs	SM	110		
0	Edges; 75 to 300 mm to plinths	LM	100		
Р	grouting bolts /inserts and the like by holding in position when pouring concrete not exceeding 600mm long-bolts supplied by client	NO	80		
Q	13mm thick plaster (1:3mix) to top surface of foundations with smooth finish trowelled	SM	60		
R	Attendance for KPLC staff to do earthing before all blinding including security for all copper strip edges	ITEM	1		
	supply and install 32mm heavy duty PVC flexible conduit fastened on switchgear plinth reinforcement to lengths not exceeding 5.0metres in every plinth and to flush with finished plith level for earthing conductor.	ITEM	1		
-					
-					
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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
4	23 MVA TRANSFORMER PLINTH				
E	Excavate pit foundations not exceeding 1,5 metres deep from reduced levels	СМ	70		
F	Return fill and ram suitable excavated material to the sides of	CM	15	-	
	the plinths	CM	15		
G	Cart away from site surplus excavated materials	СМ	39		
Н	Plain concrete 50mmm thick blinding 1:4:8 to footing	SM	50		
	Vibrated Reinforced Concrete Class 25/20 mm Agaregate in:-				
	Base	СМ	16		
J	PEDESTALS	СМ	10		
K	COVER SLAB-300mm thick	СМ	9		
	High Tensile Steel Reinforcement Bars; Cold Worked to BS 4461 (Provisional)				
L	8 mm-16MM diameter	KG	1800		
	Fairface Formwork to:-				
N	Sides of base 225-300mm wide	LM	28		
0	Ditto slab	LM	17		
Р	Vertical sides of footing	SM	51		
	Hardcore filling				
A 	Approved hardcore filling compacted to Engineer's approval AND MARRUUM layer 300mm	СМ	36		
В	Blind surface of hardcore with lean concrete	SM	18		
С	1000 gauge polythene sheet laid over hardcore	SM	24		
	Total this page and Carried to Summary Page	5/41	41		
	SUMP RCC WALLING			e e	
	Mass insitu concrete (1:4:8) in:-				
D	Strip footing	SM	28		
	Vibrated Reinforced Concrete Class 25/20 mm Aggregate in:-				
	Base	CM	6		
Е	Walling finished fair face	СМ	6	-	
Е	Formwork Vertical rides of base	24.4	EO	-	
F G	Vertical sides of base Vertical sides of walling	SM LM	50 56		
<u> </u>	High Tensile Steel Reinforcement Bars; Cold Worked to BS 4461 (Provisional)	LIVI	J0		
Н	8-12 mm diameter	KG	1000		
-	TOTAL THIS PAGE	-,-			



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
J	allow for transformer pit grating made of 50x50x6mm angle iron fixed on pedestal and wall of sump to suport grating including grating with 20mm gaps on a mainframe of 50x50x6mm ms angles and similar size welded at 20mm centres including all painting ,steel work and fixing to client approval to cover transformer pit	ITEM	2		
К	OIL sump chamber2m x 5m x 2m deep; perimeter 200mm thick block walling; internal plaster complete with niru finish; with ring beam at every 2m interval 250x200mm with 4 nos.12mm bars and 8mm shear links at 200mm spacing; cover slab with manhole opening 150mm reinforced with 8mm steel bothways at 150mm spacing; heavy duty steel cover; including pvc pipe 4"connecting with the main transformer pit not exceeding 6m awayin two compartments and connect to soakpit		1		
L	Provide galvanized 125 x 75mm U Channels welded to triangular shape (1.5x1.2x1.9metres); placed in reinforced concrete size, 1.0x1.0metres), with approx. of the tip exposed above the concrete, including 50mm diameter hole drilled on exposed section.	NO	2		
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- 6. MARKING AND PACKING
- DOCUMENTATION

ANNEX A:

Guaranteed Technical Particulars (to be filled and signed by the Manufacturer and submitted together with relevant copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records for previous five years, four customer reference letters, details of manufacturing capacity, the manufacturer's experience and copies of complete type test certificates and type test reports for tender evaluation, all in English Language)

Issued by: Hea	d of Section, Standards Development	Authorized by: Head of Department, Standards
Signed:		Signed: /Si
Date: 2015-10-	27	Date: 2015-10-27



Doc. No.	KPI/6C.1/13/TSP/09/092
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Date of Issue	2015-10-27

0.1 Circulation List

COPY NO.	COPY HOLDER	
1	Manager, Standards	
Electronic copy (po	df) on Kenya Power server (http://172.16.1.40/dms/prowse.php?fFolderid=23)	

0.2 Amendment Record

Rev No.	Date (YYYY-MM-DD)	Description of Change	Prepared by (Name & Signature)		Approved by (Name & Signature)
0 2015-10-27	New Issue	Michael Apudo	Standards	Dr. Eng. Peter	
		Zacheaus Oluoch Jeremiah Kinda Adrian Sagwe	Technical Services, Nairobi	Kimemia	
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Issued by: Hea	d of Section, Standards Development	Authorized by: Head of Department, Standards	
Signed:	CHOID.	Signed: (B)	
Date: 2015-10-	27	Date: 2015-10-27	



KP1/6C.1/13/TSP/09/092
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FOREWORD

This specification has been prepared by the Standards Department in collaboration with Central Construction Section and Technical Services Section, Nairobi, both of The Kenya Power and Lighting Company Limited (KPLC) and it lays down requirements for 400V AC Auto-Changeover Distribution Panel (ACDP) for use in the substation. It is intended for use by KPLC in purchasing the equipment.

The bid shall be submitted complete with information that confirms satisfactory service experience of the supplier with products which fall within the scope of this specification.

1. SCOPE

- 1.1. This specification intended to cover design, engineering, manufacture, assembly, painting, inspection, testing at manufacturer's works, and delivery to site inclusive of packing & transportation, testing and commissioning assistance of AC Auto-changeover (ACP) and AC Distribution Board (ACDB) complete with all accessories.
- 1.2. The specification also covers inspection and tests of the AC Auto-Changeover Distribution Panel (ACDP) complete with all accessories as well as schedule of Guaranteed Technical Particulars to be filled, signed by the manufacturer and submitted for tender evaluation.
- 1.3. The specification stipulates the minimum requirements for AC Auto-Changeover Distribution Panel (ACDP) with all accessories acceptable for use in the company and it shall be the responsibility of the Suppliers & Manufacturer to ensure adequacy of the design, good workmanship and good engineering practice in the manufacture of the AC Auto-Changeover Distribution Panel (ACDP) complete with all accessories for KPLC.
- 1.4. The specification does not purport to include all the necessary provisions of a contract.

2. REFERENCES

The following standards contain provisions which, through reference in this text constitute provisions of this specification. Unless otherwise stated, the latest editions (including amendments) apply:

IEC 61439-1, 2 &3: Low Voltage switchgear and Control gear assemblies -- Part 1: General

rules; -- Part 3: Distribution boards

IEC 61557-1&10:

Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c - Equipment for testing, measuring or monitoring of protective measures — Part 1: General requirements; — Part 10:

Issued by: Head of Section, Standards Development		Authorized by: Head of Department, Standards
Signed:	(Hall)	Signed: A. C.
Date: 2015-10-2		Date: 2015-10-27



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Combined measuring equipment for testing, measuring or monitoring of protective measures.

IEC 60947-1,2, 3&6-1: Low-voltage switchgear and controlgear --Part 1:General rules:-Part 2: Circuit Breakers;Part 3: Switches, Disconnectors, Switch-Disconnectors and Fuse Combination Units--Part 6-1: Multiple function equipment --

Automatic transfer switching equipment

IEC 61010-182-33: Sai

Safety requirements for electrical equipment for measurement, control, and laboratory use -Part 1: General requirements; -Part 2-033: Particular requirements for hand-held multimeters and other melers, for domestic and professional use, capable of measuring mains voltage.

IEC TS 60815-1:

Selection and dimensioning of high-voltage insulators intended for use in polluted conditions - Part 1: Definitions, information and general principles

3. TERMS AND DEFINITIONS

For the purpose of this specification, the definitions given in the reference standards shall apply.

Class PC:

ATSE (Automatic transfer switching equipment) that is capable of making and

withstanding, but is not intended for breaking

short-circuit currents.

O:

Represents a breaking operation;

CO:

Represents a making operation followed, after the appropriate opening time, by

a breaking operation:

t:

Represents the time interval between two successive short-circuit operations

which shall be as short as possible, allowing for the resetting time

4. REQUIREMENTS

4.1. Service Conditions

4.1.1. Physical conditions

The 400VAC Auto change over panel and distribution board complete with all accessories shall be tropicalized, designed and constructed for continuous indoor operation in tropical areas and harsh climatic conditions including areas exposed to:

- a) Altitudes of up to 2200m above sea level,
- b) Humidity of up to 95%,
- Average ambient temperature of +30°C with a minimum of -1°C and a maximum of +40°C.

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Signed:	Signed: 1911
Date: 2015-10-27	Date: 2015-10-27



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- d) Heavy saline conditions along the coast and
- e) Annual mean isokeraunic level of up to 180 thunderstorm days.
- f) Seismic level (Horizontal acceleration).: 0.3 g (horizontal); 1.5g (vertical)

4.2. Design and Construction

4.2.1. General

- 4.2.1.1. The AC auto-changeover distribution panel shall be a modular equipment rated 400V at 50Hz consisting of AC Auto-changeover compartment interfaced to an AC Distribution Board. The panel shall comply with the requirements of IEC 61439-1, 2 & 3 and IEC 61010-1&2-33.
- 4.2.1.2. The AC Auto-changeover compartment shall be designed for use as an automatic supply change over panel, which will automatically changeover the supply from the mains to the alternative supply and back again. A third off side shall be provided to be selected manually in the absence of power from the two normal sources using independent, manually operated switch.
- 4.2.1.3. The AC Auto-change-over panel compartment shall have two (2) three (3) phase incoming circuits complete with controls and auxiliary circuits, each with:
 - a) An Automatic transfer switching equipment (ATSE) units rated 250A 400V at 50Hz designed, manufactured and tested in accordance with IEC 60947-1 and IEC 60947-6-1. The ATSE shall be 4-pole in design as per the circuit diagram in Annex B and Fig. 1 of IEC 60947-6-1. The solid neutral pole on the contactor shall be lined with a copper bar per breaker. The ATSE shall be mechanically and electrically inter-locked so that the preferred alternative supply and the mains supply CANNOT be connected to the load at the same time.
 - b) An independently manual operated switch suitable for making, breaking and isolating, rated 250A, 400 V AC at 50Hz designed, manufactured and tested in accordance with IEC 60947-1 and IEC 60947-3 that provide each automatic transfer switch with two-way bypass-isolation.
- 4.2.1.4. AC Distribution compartment shall be equipped with two (2) number 4-pole Switch Fuse Disconnector Units manufactured in accordance with IEC 60947-3, OR MCCBs manufactured in accordance with IEC 60947-1 & 2 rated 250A, 400V AC at 50Hz, a suitably rated busbar (load bus) and sixteen (16) number of outgoing feeders controlled by suitably rated MCBs designed, manufactured and tested in accordance with IEC 60898-1. In case of tripping of any outgoing feeder MCBs, visual and audible alarm arrangement.

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- 4.2.1.5. The design shall also include two (2) other compartments namely-instruments compartment and Feeder compartment. These compartments shall have doors as described below.
 - For Instrument compartment, one (1) door with indicating instruments, indicating lamps, selector switches, and nameplate mounted on it.
 - b) For feeders' compartment, one (1) inner door with one opening for handle to operate switch fuse units/MCCBs and cutouts for outgoing MCBs. One outer door without cutouts with non-breakable transparent sheet shall be provided.
- 4.2.1.6. The AC auto-changeover distribution panel shall be designed to facilitate cable entry from the bottom through entry holes of removable plates provided at the bottom of the cubicle. All the accessories required for termination of cable in the AC auto-changeover distribution panel such as screwed brass cable gland, terminal block etc. shall be provided. Glands shall project above the gland plate. The bottom plate shall have the following holes, perforated and easily punched out:
 - a) 8nos. 25mm2 holes on the distribution side.
 - b) 8nos. 20mm2 holes on the distribution side.
 - 3nos. 32mm² holes on the side with input Automatic transfer switching equipment (ATSE) units.
- 4.2.1.7. Terminating cables shall be armored and armored rods shall be connected to the earth bus. After isolation of power and control circuit connections it shall be possible to safely carryout maintenance in a compartment with the bus bar and adjacent circuit live. Necessary shrouding arrangement shall be provided for this purpose over the cable terminations located in cable alley.
- 4.2.1.8. The connections from bus bars from the Auto-Change-Over Unit to the main Switch Fuse Disconnector Unit/MCCBs shall be fully insulated/shrouded and securely bolted. The partition between the feeder compartment and cable alley may be non-metallic and shall allow cable cores with lugs to be easily inserted in the feeder compartment for termination.
- 4.2.1.9. Necessary and safe earthing arrangement with supply of all accessories required for safe earthing shall be within the scope of supply.
- 4.2.1.10. A galvanized steel earthing shall be provided at the bottom of each panel and shall extend throughout the length of the AC auto-changeover distribution panel. It shall be welded/bolted to the frame work of each panel and the breaker earthing contact bar vertical bus shall be provided in each vertical section which shall in turn be bolted/welded to main horizontal ground bus.

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- 4.2.1.11. The earth bus shall have sufficient cross-section to carry momentary short circuit and short line fault currents to earth bus without exceeding the allowable temperature rise.
- 4.2.1.12. The horizontal earth bus shall be projected out of the AC auto-changeover distribution panel ends and shall have predrilled holes for bolted connection between this bus to sub-station earthing conductor. A joint spaced and taps to earth bus shall be made through at least two bolts. All non-current metal works of the AC auto-changeover distribution panel shall be effectively connected to the earth.
- 4.2.1.13. The AC auto-changeover distribution panel shall be dust and vermin proof and suitable for use in tropical climate. All ventilating louvers and holes shall be covered with fine non-ferrous wire mesh from inside. The panels shall have at least IP55 protection against enclosure as per IEC 60529:2013 and at least IK08 impact protection as per IEC 62262:2002.
- 4.2.1.14. Suitable rust resisting primer paint (Powder coated Pebble Grey RAL -7032 in colour) shall be applied on the panel after the same is polished and the primer shall be evenly sprayed. The colour of the exterior of the panel shall be of same colour as that of the main control and relay panel. The colour of the interior panel shall be as to provide a colour contrasting background for the wiring inside the cubicle.
- 4.2.1.15. The AC auto-changeover distribution panel shall be mounted on galvanized stands of about 200mm for free standing with removable gland plates for cable entry and shall be complete with channel bottom plates, grouting bolts, earthing bolts, washers, cable glands etc.
- 4.2.1.16. The temperature rise of horizontal and vertical bus-bars when carrying rated current along its full run shall not exceed 40°C with Silver plated joints and 40°C with all other type of joints over an outside ambient temperature of +30°C in accordance with IEC 61439-1.
- 4.2.1.17. All identical circuit breakers and module chassis of same test sizes shall be fully interchangeable without doing any modification work. MCCBs and MCBs shall comply fully with IEC 60947-1 & 2 and IEC 60898-1 & 2 respectively.

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TITLE: SPECIFICATION FOR 420V AC AUTOCHANGEOVER DISTRIBUTION PANEL

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Table 1: Requirements for 400V AC Auto-change-over Distribution Panel

Sr. No	Description		Technical Particulars	
	400V ACDP	- In accordance with IEC 61439-1	-1.2 & 3	
1	Dimensions Height of complete panel (mm.)		1800 (max.)	
		Working height (mm.), min	450(min.) to 1650(max.)	
		Length (mm.),min	As per requirement.	
		Width(mm), min	750 mm (max.)	
3	Sheet steel th	nickness of panel (mm.), min	3	
	Panel board f	inish paint	Powder coated Pebble Grey RAL -7032	
4	Ingress Prote	ction	IP55	
5	Clearances		5.5 mm for Upk 6.0 kV as per IEC 61010-1	
6	Creepage dis		25.4 mm for Urms 1800 V, Pollution level III	
7	Insulation res	istance of the equipment	>10MQ	
8	Resistance to	corrosion	Severity test A for interior siting	
9	Effective continuity between exposed conductive parts of the assembly and the protective circuits		< 0.1 Ohm	
10	Grade of insulation Level of equipment and wiring (KV)		1.1	
11	Power frequency withstand voltage, Vrms		3.5 kVrms	
12	Lightning impulse voltage, Vpeak		6.0 kVpk	
13	Annunciation for blowing of fuse or tripping of breaker		Alarm and visual indication	
14	Ammeter range		0 to 300 Amps	
15	Voltmeter ran	ge	0 to 600 Volts	
16		s of Ammeter & Voltmeter	1% of full scale deflection	
17	Current density of Copper for Bus bar (A/sq.mm.)		0.75	
18	Wiring for annunciation scheme shall be done with copper of cross-section area (mm²)		1.5 (Stranded)	
19	Internal wiring (connection to MCBs) cable size/type & colour		4.0mm² /10mm² insulated copper wire - Red .yellow& Black as applicable	
20	Earth wiring size and colour code		2.5mm²Insulated copper wire -Yellow/green wire	
21	Lifting lugs		Test run with the maximum mechanical load	

4.2.1.17.1. Relays and releases for the ATSE shall be defined using the following characteristics:

- a) Standard of manufacture, where applicable:
- b) Type of relay or release;
- c) Rated values;
- d) Current setting or current setting range;
- e) Time-current characteristics
- f) Influence of ambient air temperature,

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- 4.2.2. Main Equipment and other Technical Information for A.C. Auto-change Distribution Board
- 4.2.2.1. One set of tinned copper bus bars of adequate continuous rating 250A at 50Hz, short circuit rating of 10kA for 1s; having continuous current density of 0.75 A per mm² shall be provided.
- 4.2.2.2. Auxiliary Relays and contactors for alarm as well as visual indication against tripping of incoming two (2) 250A 4-pole switch fuse disconnector units/MCCBs as well as outgoing feeder MCBs shall be provided. However, indication will not go off till the restoration of failure. Facility for manual and electrical interlocking of the two (2) input switch fuse disconnector units/MCCBs and a control voltage for the ACDP shall be 230V AC. Tripping indication shall be provided for the two incoming circuits.
- 4.2.2.3. Two (2) 250A 4-pole manual bypass switches meant to connect main bus to one of the incoming supplies. The bypass-isolation switch shall permit load by-pass to either normal or emergency power source and complete isolation of the automatic transfer switch, independent of transfer switch position. Bypass and isolation shall be possible under all conditions including when the automatic transfer switch is removed from service. The equipment shall operate as follows:
 - a) The bypass-isolation switch shall have provisions for operation by one person through the movement of a maximum of two handles at a common dead front panel in no more than 15 seconds.
 - b) It shall provide a lock, which must energize to unlock the bypass switch, to prevent bypassing to a dead source and a means to prevent simultaneous connection between normal and emergency sources.
 - c) Operation of bypass handle shall allow direct connection of the load to the normal (or emergency) source, without load interruption or by using a break-before-make design, or provide separate load interrupter contacts to momentarily interrupt the load to ensure
- 4.2.2.4. Two (2) 250A 4-pole self-acting equipment containing the transfer switching devices (ATSE) and other necessary devices for monitoring supply circuits and for transferring one or more load circuits from one supply to another. These shall be the main sources that are auto-changed in case of failure of any of the source. The equipment shall operate as follows:
 - a) The operating sequence of ATSE shall consists of an automatic transfer of a load from the normal supply to an alternative supply in the event of a monitored supply deviation and automatically returning the load to the normal supply when it is restored. The transfer shall be with a pre-set time delay and may include an off position.

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- b) In the case of both the normal and the alternative supplies being present, the ATSE shall assume the normal supply position. A variation in the power supply characteristics being monitored shall signal the ATSE to operate when a deviation from the specified limits occurs, for example, abnormal changes in voltage or frequency of the supply.
- c) The ratings and characteristics of control circuit devices and auxiliary circuits shall comply with the requirements of IEC 60947-5 (see note of clause 1).

Table 2: Ratings of the Auto Transfer Switches and the Manual Bypass Switch in accordance with IEC 60947-1, 3 & 6-1

Sr.	Property	Units	Requirement	
No.			Auto-Transfer Switch as per IEC 60947-1 & 6-1	Manual Bypass Switch as per IEC 60947-1 & 3
1	Utilization category		AC-33A	AC-22A
2	Class of equipment		PC	
2 3 4	Rated duty			
4	Rated voltage	V	400	
	Maximum power frequency or d.c. recovery voltage.	V	1000	
6	Dielectric strength at 50z in 1 min	kV	16	0
	Rated impulse withstand voltage	kV	12	
8	Rated thermal current	Α	250	
9	Rated operational power	kW	75	
10	Rated operational current, le	A	250	
11	Rated breaking and making capacity, I	Α	1,500	750
12	Rated short time withstand current, lcw for 1s	Ā	8	
13	Rated short time making capacity, Icm	kA	30	0
14	Rated conditional short-circuit current, lp	kA	40.5	
15	Power loss per pole	W	6.5	
16	Operating cycle		0-1-0-11-0	
17	Number of operating cycles corresponding to the rated operational current	Cycles	8,0	00
18	Number of mechanical operations	Oper.	16,0	000

4.2.2.5. 'ON', 'OFF' and 'TRIP' indicating lamps for both the incoming Switch Fuse Disconnector Units/MCCBs along with required number of push button shall be provided.

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- 4.2.2.6. One (1) digital A.C. voltmeter having a scale range of 0-600V.A.C. with approximately 72 x 144 mm² diameter flush mounted, type having accuracy. +/- 1% of full scale, shall be provided. The meters shall have overvoltage category of at least CAT IV 600V as per IEC 61010-1 and shall conform to IEC 61557: Parts 1, 2, 3, 4 & 10 standards.
- 4.2.2.7. Two (2) digital A.C. ammeters with approximately 72 x 144 mm² diameter flush mounted, having range of 0-300 Amps and accuracy +/- 1% of full scale shall be provided for measurement of load current flowing to the A.C. auto-change distribution panel. The meters shall have overvoltage category of at least CAT IV 600V as per IEC 61010-1 and shall conform to IEC 61557: Parts 1, 2, 3, 4 & 10 standards.
- 4.2.2.8. Doors at the back of the panel shall be provided for inspection with door switch for illumination of the lamp to be provided inside the panel with separate switch fuse unit for controlling the lamp.
- 4.2.2.9. All the indicating lamps shall be of panel mounting cluster LED type. The lamps shall have suitable size plates marked with its function, wherever necessary. Lamps shall have translucent lamp covers of 'RED', 'GREEN' & 'WHITE' colour for indicating, 'ON', 'OFF' and 'AUTO-TRIP' indication of incoming switch fuse unit. One (1) indicating lamp is to be provided for tripping of outgoing feeder and AC supervision.
- 4.2.2.10. Space heater shall be provided for preventing harmful moisture condensation in all the compartments. The space heaters shall be suitable for continuous operation of 240V AC, 50HZ single phase supply and shall be automatically controlled by themostats. Necessary isolating switches and HRC fuses shall be provided.
- 4.2.2.11. All the A.C. MCBS, A.C. Auxiliary Relays, isolating copper links, A.C. emergency MCBs, & A.C. emergency contactors, A.C. bells, indicating lamp for indicating A.C. fail of main bus, A.C. contactors etc. shall be provided. Three (3) Push Button for testing annunciation scheme, resetting annunciation scheme and accept of fault and bell cancellation shall be provided.
- 4.2.2.12. There shall be one (1) terminal board/block for all feeder outlets including cable glands, a facility to select the phase-phase voltage levels and to pick contacts indicating loss of incoming supplies to the remote terminal unit.
- 4.2.2.13. The AC Control and distribution board shall be equipped with double pole MCBs with a Type C tripping characteristic in accordance with IEC 60898-1. The MCBs shall be AC type rated 240V. The outgoing distribution cables shall be connected directly to the relevant MCB. The MCBs shall have the following characteristics;
 - a) Circuit-breakers suitable for A.C circuits with a time constant of T <4 ms.
 - b) Rated short-circuit capacities up to and including 10 kA
 - c) Instantaneous tripping of more than 5ln up to and including 10ln C-type curve

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- d) Rated impulse withstand voltage (Upeak) of 4 kV
- e) Two-pole circuit-breakers with two protected poles.

Table 3: Technical requirements for MCCB and MCBs as per IEC 60947-2 and IEC 60898-1 & 2 respectively

Sr. No.	Property	Requirement	
1	Type of Breaker	Moulded case	MCB
2	Method of mounting	Surface-type	Flush-type;
3	Utilization Category		A
4	Current rating	2 x 250A	1x10A, 8x16A, 4x25A and 4x32A ,2x63A
5	Rated Voltage	240V AC per pole	
6	No. of poles	4	2
7	Type of terminals:	Screw type for external copper conductor	
8	Insulating Voltage	690 V	
9	Rated Impulse Withstand Voltage of main Circuit Uimp	8 kV	4 kV
10	Temperature rise	40°C	
11	Instantaneous tripping current	Type C	
12	I ² t characteristic	To be provided by manufacturer	
13	Rated Continuous Current at 40°C	As per Rating	
14	Short-time withstand capacity, low for 0.1s	5kA	1.5kA
15	Ultimate Short Circuit Breaking Capacity Icu	30 kA	10 kA
16	Service Short Circuit Breaking Capacity Ics	100% of Icu	
17	Ultimate Short Circuit Making Capacity Icu	63kA	Type C tripping current
18	Maximum power loss	Manufacturer to state	As per Table 15 of IEC 60898-1:2002
19	Suitable for Isolation	Yes	
20	Shunt Release Voltage	230V AC	
21	Permissible Variation in Voltage	85% to 110%	
22	Number of operating cycles	8,000	
23	Termination suitable for Copper	Yes	
24	Insulation Material conforming to Glow Wire Test	Yes	
25	Thermal Over load Settings	Adjustable	
26	Short Circuit Setting	4-pole	Fixed for 2 Pole
27	Degree of protection		IP20

4.2.3. Factory Wiring

Wiring and labeling either by color-code or by numbered/lettered wire markers shall be done at the factory with proper wire bundling. Labels shall match those on the shop drawings. This shall be as follows:

 a) Current carrying wires shall be black with clearly indicated ferrule labels showing the phase.

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- b) Earthing wiring shall be done using yellow/green wires.
- c) Control cabling shall be done using grey colour wires with ferrule marking.
- d) Voltage carrying wires shall be colour coded (Red, Yellow, Blue, and Black).

4.3. Quality Management System

- 4.3.1. The supplier shall submit a quality assurance plan (QAP) that will be used to ensure that the 400V ACDP physical properties, tests and documentation, will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008.
- 4.3.2. The Manufacturer's Declaration of Conformity to applicable standards and copies of quality management certifications including copy of valid and relevant ISO 9001: 2008 certificate shall be submitted with the tender for evaluation.

5.0. TESTS AND INSPECTION

- 5.1. The 400V ACDP shall be inspected and tested in accordance with the requirements of IEC 61010-1, IEC 60947-1, 2, 3 & 6.1, IEC 61439-1&2, IEC 60898-1&2, IEC 60529 standards and requirements of this specification. It shall be the responsibility of the supplier to perform or to have performed the tests specified and whatever other tests he normally performs at works.
- 5.2. Copies of previous Type Tests Reports issued by a third party testing laboratory that is accredited to ISO/IEC 17025 shall be submitted with the tender for the purpose of technical evaluation. The accreditation certificate to ISO/IEC 17025 for the same third party testing laboratory used shall also be submitted with the tender document (all in English Language)Copies of type test reports to be submitted with the tender (by bidder) for evaluation shall be as stated below:

A. Complete assembly as per IEC 61010-1, IEC 61439-1&2

- (i) Electromagnetic compatibility (EMC)
- (ii) Switching tests on the equipment.
- (iii) Impulse overvoltage tests on the equipment -Clearances
- (iv) Dielectric voltage withstand tests on the equipment Controlled overvoltage
- (v) Functional tests on the equipment.

B. Circuit Breakers as per IEC 60947-1, 2, 3 & 6.1 and IEC 60898-1 & 2

- a) Temperature-rise
- b) Tripping limits and characteristics
- c) Dielectric properties
- d) Operational performance capability
- e) Overload performance (where applicable)

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- f) Short-circuit breaking capacities
- g) Short-time withstand current (where applicable)
- h) Performance of integrally fused circuit-breakers
- 5.3. Routine and sample test reports for the 400V ACDP to be supplied shall be submitted to KPLC for approval before shipment/delivery of the goods. KPLC Engineers will witness tests at the factory before shipment.
- 5.4. Tests to be witnessed at the factory before shipment shall be in accordance with requirements of this specification and shall include the following:

A. Complete assembly as per IEC 61010-1, IEC 61439-1&2

- a) Degree of protection of enclosures
- b) Clearances and creepage distances
- c) Protection against electric shock and integrity of protective circuits
- d) Incorporation of built-in components
- e) Internal electrical circuits and connections
- f) Terminals for external conductors
- g) Mechanical operation
- h) Electrical tests
 - Wiring, operational performance and function
 - · Insulation resistance tests of the equipment
 - Checking of wiring and continuity of the circuit.
 - Power frequency voltage test of 3.5 kV for one minute between wiring and earth terminal.
 - Insulation resistance value of all equipment connected in 400V ACDP and functions of the same.
 - Dielectric voltage withstand tests Measuring clearances
- i) Functional tests of the equipment
- i) Dimensional and overall checks.

B. Switches and Circuit Breakers as per IEC 60947-2 and IEC 60898-1 & 2

- a) Tripping limits and characteristics
- b) Dielectric properties
- c) Mechanical operation and operational performance capability
- d) Overload performance (where applicable)
- e) Verification of dielectric withstand
- Verification of temperature-rise
- g) Verification of overload releases
- h) Verification of under-voltage and shunt releases (if applicable)
- i) Verification of main contact position (for circuit breakers suitable for isolation)

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5.5. On receipt of the goods KPLC will perform any of the tests specified in order to verify compliance with this specification. The supplier shall replace without charge to KPLC the 400V ACDP which upon examination, test or use; fail to meet any of the requirements in the specification.

6.0. MARKING AND PACKING

6.1. PACKING

- 4.3.3. The 420V ACDP shall be carried in a sturdy transport case with hard-foam interior, water tight, air-tight, dust proof, chemical resistant and corrosion proof. The total case dimensions shall not exceed 3800mm x 1200mm x 1200mm in size.
 - 6.1.1. The housing shall be complete with a gasket to seals the lid when closed so as to protect the equipment against water and dirt while the instrument is carried through rainstorms or other hazardous conditions. The lid shall be secured by two latches and a handle for portability. A compartment shall also be provided for storage of test cables and line cord.
 - 6.1.2. The accessories shall be packed in suitable matching bag with a shoulder carrying strap and a hand grip.

6.2. MARKING

The 400V ACDP and its accessories shall be marked in a permanent manner with the following information (in English Language):

- a) Standard to which the 400V ACDP complies
- b) Name of manufacturer
- c) Type of 400V ACDP (description of type, number and overall size of sections)
- d) Year and month of manufacture and serial number
- e) Maximum permissible measurement limits
- f) The words "Property of Kenya Power & Lighting Co" shall be engraved permanently on each 400V ACDP while the other parameters shall be marked on a permanent label.
- g) The overvoltage protection category and duty rating e.g. category IV-field
- h) The 400V ACDB shall be provided with a separate permanent label displaying advice to the user.
- i) In addition, the 400V ACDB shall be marked with the necessary labels that conform to IEC 61010-1 clauses 5.1.2 to 5 and its accessories

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DOCUMENTATION, WARRANTY AND TRAINING 7.0.

7.1. Warranty and Training

- 7.1.1. The 400V ACDB shall be backed by a minimum 12-months factory warranty.
- 7.1.2. If the ACDP new to KPLC, then a two day Training on the equipment shall be carried out by the Supplier's engineer on a KPLC site. The supplier shall meet the cost of this training.
- 7.1.3. After tender award, factory inspection and certification by two KPLC's engineers or third party shall be carried out before shipment of the Equipment.
- 7.1.4. Technical support and software, where applicable upgrades shall be provided free of charge to KPLC for a period of not less than 36 months.
- 7.1.5. The Bidder shall submit a clause by clause statement of compliance with the specifications together with copies of relevant manufacturer's catalogues, brochures, technical data and proven test reports clearly marked to support each clause, all in English language for evaluation. The manufacturer's type reference/designation of the item offered shall also be indicated.
- 7.1.6. In the case of tender award, technical detailed design drawings for the 400V ACDP shall be submitted to the procuring entity for approval before manufacture commences.

Documentation

- 7.2.1. The bidder shall submit its tender complete with technical documents required by Annex A (Guaranteed Technical Particulars) for tender evaluation. The technical documents to be submitted (all in English language) for tender evaluation shall include the following:
 - a) Guaranteed Technical Particulars signed by the manufacturer;
 - b) Copies of the Manufacturer's catalogues, brochures, detailed design drawings and technical data;
 - Sales records for the last five years and at least four customer reference letters;
 - Details of manufacturing capacity and the manufacturer's experience;
 - e) Copies of relevant type test reports by a third party testing laboratory accredited to ISO/IEC 17025;
 - Copy of accreditation certificate to ISO/IEC 17025 for the third party testing laboratory;
 - Manufacturers letter of authorization, ISO 9001:2008 certificate and other technical documents required in the tender.

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- 7.2.2. The successful bidder (supplier) shall submit the following documents/details to The Kenya Power & Lighting Company for approval before manufacture:
 - a) Guaranteed Technical Particulars signed by the manufacturer;
 - b) Design Drawings with details of the 400V ACDP to be manufactured for KPLC. The drawings shall include:
 - (i) Single line diagram for each type of 400V ACDP.
 - (ii) Dimensional drawing showing clearly the location of meter switches, MCBs, MCCB etc. in the 400V ACDP arrangement in plan and elevation with foundation details.
 - (iii) Wiring diagram of 400V ACDP showing the interconnection between terminals of various equipment and devices on and within the panel including approved schematic drawings.
 - (iv) Take off terminal connection arrangement.
 - (v) Catalogue of 400V ACDP equipment.
 - (vi) Ten (10) sets of approved drawings and ten (10) copies of Catalogue of 400V ACDB equipment shall be submitted to the Chief Engineer (Technical Services – Nairobi Region) for our record and distribution to site.
 - c) Quality assurance plan (QAP) that will be used to ensure that the design, material; workmanship, tests, service capability, maintenance and documentation will fulfill the requirements stated in the contract documents, standards, specifications and regulations. The QAP shall be based on and include relevant parts to fulfill the requirements of ISO 9001:2008
 - d) Detailed test program to be used during factory testing;
 - e) All documentation necessary for safety of the equipment as specified in IEC 61010-1 clause 5.4 shall be provided with the equipment.
 - f) Manufacturer's undertaking to ensure adequacy of the design, good engineering practice, adherence to the specification and applicable standards and regulations as well as ensuring good workmanship in the manufacture of the ACDP for The Kenya Power & Lighting Company;
 - g) Packaging details (including packaging materials).
- 7.3 The supplier shall submit recommendations for use, care, storage and routine inspection/testing procedures, all in the English Language, during delivery of the 400V ACDP to KPLC stores

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Kenya Power

TITLE: SPECIFICATION FOR 420V AC AUTOCHANGEOVER DISTRIBUTION PANEL

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ANNEX A:

Guaranteed Technical Particulars (to be filled and signed by the supplier and submitted together with copies of the Manufacturer's catalogues, brochures, drawings, technical data, sales records and copies of test certificates for tender evaluation)

Tender No	Bidder's Name & Address	

	Description	Bidder's Offer
1	Name of the manufacturer and country of origin	
	Type Reference Number or Model Number	Specify
2	Applicable Standards	Specify
3	Terms and Definitions	Specify
4	Requirements	
4.1	Service conditions	Specify
4.2	Design and Construction	474174
4.2.1.1	AC auto-changeover distribution panel rating	Specify
4.2.1.2	AC auto-changeover with a third off switch in absence of power from 2 normal sources	Specify
4.2.1.3	ATSE rating	Specify
	ATSE design	Specify
	Solid neutral poles on contactors with copper bar per breaker	Specify
	Mechanical and electrical interlocks availed	Specify
	Independent manual switch	Specify
4.2.1.4	AC Distribution compartment with 4 pole switch fuse disconnector units	Specify
	With 16 outgoing feeders and MCBs	Specify
	With Visual and audible alarms for feeders tripping	Specify
4.2.1.5	Audio visual Indication for AC supply	
	Manual cancellation and reset of alarm for failure of AC supply	Specify
4.2.1.6	Acceptance and cancellation of the audible alarm shall be provided for	Specify
	The visual alarm shall only be cancelled upon supply restoration	Specify
4.2.1.7	Instrument compartment features	Specify
	Feeder compartment features	Specify
4.2.1.8	Cable entry at bottom of panel	Specify
	Entry holes of removable plates	Specify
	Cable termination accessories e.g. screwed brass cable gland and terminal blocks provided	Specify
	8no.x25mm² holes on distribution side	Specify
	8no.x20mm² holes on distribution side	Specify
	3no.x32mm² holes on ATSE side	specify
4.2.1.9	Armored termination cables with armored rods connected to earth bus	Specify
	After isolation of power and control circuits, safe maintenance is possible	Specify

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DISTRIBUTION PANEL

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Specify

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	with adjacent circu	it and bus bar live			
4.2.1.10	Connections from bus bars well insulated		Specify		
	Partition between feeder compartment and cable alley material		Specify		
	Partition allows cable cores with lugs to be easily inserted in feeder compartment		Specify		
4.2.1.11	Safe earthing done		Specify		
	All required earthing	ng accessories provided	Specify		
4.2.1.12	Galvanized steel earthing provided- welded/bolted to framework and breaker earthing contact bar		Specify		
4.2.1.13		ection able to withstand short circuit and line fault currents at exceeding allowable temperature rise	Specify		
4.2.1.14	Earthing bus protr	udes from panel and has predrilled holes for bonding to	Specify		
4.2.1.15	Panel shall be dust and vermin proof		Provide report	tes	
4.2.1.16	Rust resistant primer paint applied		Specify		
	Color of paint		Specify		
4.2.1.18		of bus bars at rated current	Specify		
4.2.1.19	Identical circuit breakers and module chassis shall be interchangeable		Specify		
Table 1	Table 1: Requirements for 400V AC Auto-change-over Distribution				
	Dimensions:	Height of complete panel (mm)	Specify		
		Working height (mm), min	Specify		
		Length(mm), min	Specify		
		Width(mm), min	Specify		
	Sheet steel thickness of panel(mm), min				
	Panel board finish paint			-	
	Ingress protection				
	Clearances				
	Creepage distances		Specify		
	Insulation resistance of the equipment		Specify		
	Resistance to corrosion				
	Effective continuity between exposed conductive parts of the assembly and the protective circuits				
	Grade of insulation level of equipment and wiring (KV)				
	Power frequency withstand voltage, Vosak				
	Power frequency withstand voltage, V _{rms}				
	Annunciation for blowing of fuse or tripping of breaker		Specify Specify		
	Ammeter range		Specify		
	Voltmeter range		Specify		

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Accuracy class of Ammeter & Voltmeter



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	Current density of (Copper for bus bar (A/sq.mm)	Specify	
	Wiring for annuncia area (mm²)	ation scheme shall be done with copper of cross-section	Specify	
	Internal wiring (Co	Specify		
	Earth wiring size and colour code			
	Lifting lugs		Specify	
4.2.1.19.1	Relay characteristics Standard of manufacture		Specify	
		Type of relay or release	Specify	
		Rated values	Specify	
		Current setting / current setting range	Specify	
		Time-current characteristics	Specify	
		Influence of ambient air temperature	Specify	
4.2.2.1	A set of tinned cop	per bus bars provided	Specify	
	Rating of copper be	us bars/ short circuit rating	Specify	
4.2.2.2		with audio visual tripping indication/ electrical and iking/ tripping indication	Specify	
4.2.2.3	Bypass isolation	Operation	Specify	
	switch	Locks/interlocks operation	Specify	
		Operation of bypass handle to allow for direct connection of load to the normal(or emergency) source	Specify	
Table 2	Utilization category		Specify fo	
	Class of equipmen	Auto transfe		
	Rated duty	switch an		
	Rated voltage			
	Maximum power fr	switch		
	Dielectric strength			
	Rated impulse with	1		
	Rated thermal curr			
	Rated operational			
	Rated operational	Ī		
	Rated breaking and	d making capacity, I		
	Rated short time w	Rated short time withstand current, low for 1s		
	Rated short time m	aking capacity, I _{cm}		
	Rated conditional s	hort-circuit current, Ip		
	Power loss per poi	Power loss per pole		
	Operating cycle		1	
	Number of operating	Number of operating cycles corresponding to the rated operational current		
	Number of mechan	and the state of t		
4.2.2.5	ON OFF TRIP inc	licating lamps provided	Specify	
4.2.2.6	U 0 5 5 0 5 5 - U	Scale range	Specify	
	voltmeter	Flush mounted	Specify	

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		Dimensions		
		Accuracy		Specify
		Overvoltage c	ategory	Specify
4.2.2.7	Digital	Scale range		Specify
	Ammeter	Flush mounted		Specify
		Dimensions		Specify
		Ассигасу		Specify
		Overvoltage ca	ategory	Specify
4.2.2.8	Panel lamp at ba	ick of door with	door switch	Specify
	Separate switch	fuse unit		Specify
4.2.2.9	Indicating	Panel mountin	g cluster LED type	Specify
	lamps	With size plate	marked with its function	Specify
		With Transluce	ent lamp covers RED, GREEN, WHITE	Specify
4.2.2.10	Space heaters	Suitable for co	ntinuous operation at 240V 50Hz	Specify
		With thermost	ats	Specify
	U.L. Burner	Isolating switc	hes provided	Specify
4.2.2.11	All MCBs, Auxi		lating copper links, Emergency MCBs & sprovided	Specify
	Push buttons for testing, resetting and cancellation provided			Specify
4.2.2.12	One Terminal board with facility to select phase-phase voltage levels Shall pick contacts indicating loss of incoming supply		Specify	
			Specify	
4.2.2.13	A.C Circuit breakers time constant			Specify
	Rated short circuit capacities			Specify
	Instantaneous tripping characteristics			Specify
	Rated impulse withstand voltage (Upeak)			Specify
	Two pole circuit breakers with two protected poles			Specify
Table 3	Type of breaker		Specify	
	Method of mounting			Specify
	Utilization category			Specify
	Current rating			Specify
	Rated voltage			Specify
	No. of poles			Specify
	Type of terminals			Specify
	Insulating voltage			Specify
	Rated impulse withstand voltage of main circuit U _{Imp}			Specify
	Temperature rise			Specify
	Instantaneous tripping current			Specify
	I ² t characteristics			Specify
	Rated continuous current at 40°C			Specify
	Short-time withstand capacity, I _{cw} for 0.1s		Specify	

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	Ultimate short of	ircuit breaking capacity Icu	Specify
	Service short ci	rcuit breaking capacity Ics	Specify
	Ultimate short c	ircuit making capacity I _{cu}	Specify
	Maximum power	Maximum power loss	
	Suitable for isolation Shunt release voltage		
Permissible variation in voltage			Specify
	Number of oper	erating cycles	
	Termination suitable for copper		Specify
	Insulation material conforming to glow wire test		Specify
	Thermal over lo	ad settings	Specify
	Short circuit setting		
	Degree of protection		Specify
4.2.3	Wiring and	Current carrying wires (black) with ferrule labels	Specify
	labeling done	Earthing wire yellow/green	Specify
	at factory	Control cables grey with ferrule marking	Specify
		Voltage carrying wires coded Red, Yellow, Blue and Black	Specify
4.3	Quality Management System		Provide
	Quality Assurance Plan		Provide
	Copy of ISO 9001:2008 certificate		Provide
	Manufacturer's experience		Provide
	Manufacturing capacity (Units per month)		Provide
	List of previous customers		Provide
	Customer reference letters		Provide
5.1	Test standards	and responsibility of carrying out tests	Provide
5.2	Copies of Type Test Reports submitted with tender		Provide
5.3	The second secon	Acceptance tests to be witnessed by KPLC at factory before shipment	
5.4	Test reports to be submitted by supplier to KPLC for approval before shipment		Provide
5.5	Replacement of rejected panels		Provide
6.1	Packing		Provide
6.2	Marking		Provide
7.1	Warranty and tr	raining	Provide
7.2	Documents submitted with tender		Provide
	Documents to be submitted by supplier to KPLC for approval before manufacture		Provide
8.0	Statement of co	ompliance to specification	Provide
	- Annual Control of the Control of t	CONTROL OF THE PROPERTY OF THE	

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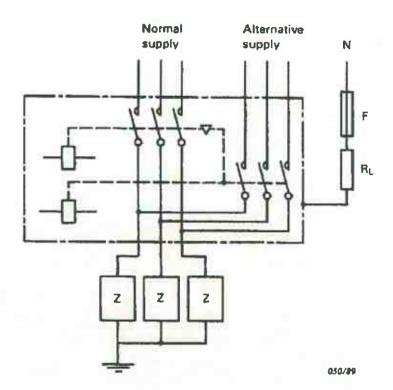


Fig. 1: Connection circuit of ATSE showing the electrical conditions without the mechanical conditions.

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Samples

3Phase AC distribution board 2. Consumer Unit







3. DC Distribution Board



4. Exhaust Fan

132/33kv Control room - Electrical accessories requirements

- For 132-33Kv substation we would prefer a floor standing, 3-phase AC distribution board with automatic change over switch. The specifications can be obtained from the turnkey department since they have been installing them in their new control rooms.
- However, where floor standing ACDB cannot be provided a wall mounted wall mounted 3Ph.-6way ACDB shall be installed 1.6 meters high direct above the control cable trench in the relay panel room. The ACDB shall be fitted with following accessories;
 - i. 2nos.of 32A Triple pole MCBs
 - ii... 6nos. of 16A Double pole MBCs
 - iii. 6nos. of 10A Double pole MCBs
 - iv. 3nos. of 4-6A Single pole MBCs
 - v. 8nos. 2.0" (inches) PVC conduits joining the board and the cable trench.
- Consumer unit should be installed next to the ACDB as shown in the drawing complete with following MCBS;
 - i. 4nos. of 16A double pole
 - ii. 4nos. of 10A double pole.
 - iii. 3nos, 1.5" (inches) PVC conduit joining the unit and the trench.
- 4. **DC distribution board**, where floor standing DC Distribution board cannot be installed, a wall mounted DC board shall be installed complete with the following accessories,
 - i. 2nos of 32A double pole MCBs
 - ii. 6nos. of 16A double pole MCBs
 - iii. 6Nos. of 10A double pole MCBs.
 - iv. 6nos. 2" inches. PVC conduits joining the board and the cable trench.
- 5. Codifications in the control room design.
 - -Introduce **Exhaust fan** and permanently close the door joining the relay panel and Battery room
 - -Introduce battery room door from outside.
 - -Control cable trench should be modified as shown in the drawing.
 - All wall mounted AC/DC supply distribution board should be less than 2M high.

132/33kv Metering room - Electrical accessories requirements

- 1. **3Ph-4way distribution board** shall be mounted 1.6M direct above the control cable trench as indicated in the drawing. It shall be fitted with following accessories;
 - i. 1nos.of 32A Triple pole MCBs
 - ii. 4nos. of 16A Double pole MBCs
 - iii. 2nos. of 10A Double pole MCBs
 - v. 3nos. of 4-6A Single pole MBCs
 - vi. 4nos. 2" (inches) PVC conduit joining the board and trench.
- 1. DC distribution board not required.
- 2. Introduce **exhaust fan** and close permanently the door joining the relay panel and battery room.
- Consumer unit should be installed next to the ACDB as shown in the drawing complete with following MCBS;
 - i. 3nos. of 16A double pole
 - ii. 3nos. of 10A double pole.
 - iii. 2nos, 1.5" (inches) PVC conduit joining the unit and the trench.