



**KenGen**

**Kenya Electricity Generating Company Limited**

**KGN-HYD ~ 020-2017.**

**INTERNATIONAL TENDER FOR REHABILITATION OF EXCITATION,  
GENERATOR MV SWITCHGEAR, LV SWITCHBOARDS AND  
PROTECTION SYSTEMS OF GITARU HYDRO POWER STATION -  
KENYA**

**ADDENDUM 3**

# **ADDITIONAL & AMENDED CLAUSES**

## **VOLUME I:**

# **BIDDING PROCEDURES AND CONDITIONS OF CONTRACT**

# ADDITIONAL CLAUSES

## SECTION IX: BIDDING AND CONTRACT FORMS

### STANDARD FORMS

*Add the following missing form*

### TENDER QUESTIONNAIRE

Please fill in block letters.

Full names of tenderer

.....

Full address of tenderer to which tender correspondence is to be sent (unless an agent has been appointed below)

.....

Telephone number (s) of tenderer

.....

E-mail and Fax address of tenderer

.....

Name of tenderer's representative to be contacted on matters of the tender during the tender period

.....

Details of tenderer's nominated agent (if any) to receive tender notices. This is essential if the tenderer does not have his registered address in Kenya (name, address, telephone, telex)

.....

.....

\_\_\_\_\_  
Signature of Tenderer

Make copy and deliver to: \_\_\_\_\_ (*Name of Employer*)

## AMENDED CLAUSES

CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
<b>SECTION IV: TECHNICAL EVALUATION CRITERIA</b>			
<b>B. COMPLIANCE TO EMPLOYER'S REQUIREMENTS</b>			
4	65-67	Project preliminary designs The sub clauses numbering is erroneous	review the indicated clause numbers as follows 1.2. to 4.1 1.2.1 to 4.1.1 1.2.2 to 4.1.2 1.2.3 to 4.1.3 1.2.4 to 4.1.4 1.3. to 4.2 1.4. to 4.3 1.4.1 to 4.3.1 1.4.2 to 4.3.2 1.4.3 to 4.3.3 1.4.4 to 4.3.4 1.4.5 to 4.3.5 1.4.6 to 4.3.6 1.4.7 to 4.3.7 1.4.8 to 4.3.8 1.4.9 to 4.3.9 1.4.10 to 4.3.10 4.1. to 4.4 4.2. to 4.5 4.3. to 4.6 4.4. to 4.7 4.5. to 4.8
4.3.2.	66	The thyristor power converter is not compact, doesn't have an independent controller and is not interfaced to the regulators via Ethernet communication interface.	The thyristor power converter is not compact, <b>not withdrawable</b> , doesn't have an independent controller and is not interfaced to the regulators via Ethernet communication interface.
<b>SECTION IV: TECHNICAL EVALUATION CRITERIA</b>			
<b>C: QUALIFICATION REQUIREMENTS</b>			
<b>QUALIFICATION CRITERIA SCHEDULE</b>			
1.2	76	Documentation Submission requirement: letter of bid	Documentation Submission requirement: <b>Mandatory Confidential Business Questionnaire form</b>

# **ADDITIONAL & AMENDED CLAUSES**

## **VOLUME II:**

### **EMPLOYER'S REQUIREMENTS /SPECIFICATIONS**

## ADDITIONAL CLAUSES

### 1 GENERAL INFORMATION AND REQUIREMENTS

#### 1.8 ENGINEERING SERVICES BEFORE INSTALLATION

*Insert the following clause*

##### 1.8.3 Power System Analysis Studies

- 1.8.3.1 Contractor shall carry out a detailed power system analysis for all Gitaru power station electrical systems in accordance to guidelines given in IEEE 399 and other best industry practices.
- 1.8.3.2 The studies shall be carried out in order to arrive at optimum settings and rating (for some protective devices) of new equipment to be supplied and the other plant and power grid equipment that the new systems will be interfaced to.
- 1.8.3.3 The studies shall be limited to Gitaru power station, however, modelling of the Power system connections to the plant shall be necessary, data required for these shall be sought from the grid operator by the employer. The contractor shall inform the employer of the necessary data early enough for the employer to seek the necessary data
- 1.8.3.4 A minimum of the following studies shall be carried out
- (a) Short-circuit studies
  - (b) Generator Stability studies
  - (c) Cable ampacity studies
  - (d) Protection Coordination studies
  - (e) DC auxiliary power system analysis
- 1.8.3.5 Data collection on existing plant equipment shall be collected during design site visit. The study parameters, operating scenarios, Contingencies etc shall be agreed upon during design
- 1.8.3.6 A detailed report of these studies and accompanying calculations shall be handed over to the employer during design stage in a similar fashion to the functional design specifications as per clause 1.7. The study models and analysis used shall be handed over to the employer in soft copy, in the original format of the analysis software.

- 1.8.3.7 Commonly available power system analysis software such as ETAP™ shall be used for these studies. The software used for these studies shall be supplied to the employer one license shall be provided
- 1.8.3.8 The outcome of these studies shall be used to determine settings of excitation controller, the protection IED’s and LV switchboards–switching devices trip units.
- 1.8.3.9 Where the result of the studies indicate that a change of equipment specifications is required, the contractor shall highlight this to the employer.
- 1.8.3.10 The sizing of low voltage switching & metering devices and instrument transformers shall be optimised based on the result of these studies.

## 1.10 INSTALLATION AND COMMISSIONING

### 1.10.2 Erection, and installation supervision

- 1.10.2.18 Total Station outage and temporarily supplies

*Insert the following clause*

- (f) During total station outage, the following critical station loads shall be supplied.

No	Switchboard & location	Description	Estimated Max Three phase load @415V AC	Type of loading
1	Main station auxiliaries’ switchboard-auxiliaries section (control room)	Dewatering pump 1	88A	Intermittent
2		Dewatering pump 2	88A	Intermittent
3		Ventilation fan	130A	continuous
4		110V Battery charger	15A	Continuous
5		50V Battery charger	10A	Continuous
6		Lift supply	14A	Intermittent



No	Switchboard & location	Description	Estimated Max Three phase load @415V AC	Type of loading
7		Control & office buildings supply board	7A	continuous, high day time, low at night
8		UPS supply	7A	Continuous
9		Water treatment plant	40A	Continuous
10		Street & station flood lights	12A	night only
11	General services switch board (power house)	Turbine house cranes	210A	occasional-during lifting work only
12		Lighting and small power	32A	continuous
13	Spillway gates control centre (spill way gates)	Gates control unit	65A	continuous
14		Lighting and small power	3A	occasional

## 2 SCOPE OF WORKS

*Insert the following clause*

### 2.7 CABLES SCOPE OF SUPPLY

#### 2.7.1 MV cables

2.7.1.1 Contractor shall manufacture, test, supply, install and commission three (3) (one for each unit) Station transformer HV side connection MV **copper** cables to connect the three station transformers and the new MV generator switchgear. Cables shall be sized and rated as per clause 6.2.5.1

2.7.1.2 Contractor shall supply and construct concrete cable trenches at the substation to guide the cables from the MV switchgear to the station transformers. Trenches shall

be covered with concrete blocks. Design of trenches shall be approved by the Engineer

2.7.1.3 Existing Generator MV cables (from generator terminals at the power house to the 15KV busbars at the substation) shall be re used and **are not** in scope of supply.

## 2.7.2 LV Switchboard Power Cables

2.7.2.1 All existing cables terminated to the low voltage switchboards cables in the scope of supply shall be removed and replaced with new copper cables. Accurate cable lengths of existing cables are not available, bidders who wish to get the accurate lengths can visit the station and measure. The lengths given below are estimates, the approved bidder during design site visit shall collect the accurate required cable lengths and rating, employer shall not be liable if the cables supplied by the contractor are not sufficient to connect the systems.

2.7.2.2 Contractor shall manufacture, test, supply, install and commission new power cables meeting the requirements in clause 3.7 and 8.7. and with minimum ratings provided in the table below.

No	ORIGIN	DESTINATION	Minimum Cable continuous current rating at 690V AC & 40°C ambient temp	Minimum cable Short circuit withstand at 500V AC	Estimated Distance (meters)
1	main station switchboard (control room)	Emergency diesel generator (EDG)	1600A	50kA/ 1s	100
2		Alternative supply transformer	1600A	50kA/ 1s	80
3		Station transformer 1 (proposed)	1600A	50kA/ 1s	80
4		Station transformer 2	1600A	50kA/ 1s	60
5		Station transformer 3	1600A	50kA/ 1s	40
6		Main station auxiliaries' switchboard	1600A	50kA/ 1s	20
7		Intake gate control centre	315A	50kA/ 1s	500
8		Spill way gates control centre	315A	50kA/ 1s	400
9		Station auxiliary switchboard	800A	50kA/ 1s	220
10	Main station auxiliaries' switchboard-	Dewatering pump 1	160A	25KA/ 1s	250
11		Dewatering pump 2	160A	25KA/ 1s	250
12		Dewatering pump 3	160A	25KA/ 1s	250

No	ORIGIN	DESTINATION	Minimum Cable continuous current rating at 690V AC & 40°C ambient temp	Minimum cable Short circuit withstand at 500V AC	Estimated Distance (meters)	
13	auxiliaries section (control room)	Ventilation fan 1	315A	25KA/1s	50	
14		Ventilation fan2	315A	25KA/1s	50	
15		110V Battery charger	160A	25KA/1s	30	
16		50V Battery charger	160A	25KA/1s	30	
17		Power outlet 1	160A	25KA/1s	180	
18		Power outlet 2	160A	25KA/1s	180	
19		Lift supply	160A	25KA/1s	50	
20		Air conditioning board	100A	25KA/1s	60	
21		Unit 1 generator transformer kiosk	160A	25KA/1s	90	
22		Unit 2 generator transformer kiosk	160A	25KA/1s	80	
23		Unit 3 generator transformer kiosk	160A	25KA/1s	60	
24		Unit 1 station transformer & MV switchgear supply	50A	25KA/1s	90	
25		Unit 2 station transformer & MV switchgear supply	50A	25KA/1s	60	
26		Unit 3 station transformer & MV switchgear supply	50A	25KA/1s	40	
27		Alternative supply transformer supply	50A	25KA/1s	80	
28		Emergency diesel generator (EDG)	50A	25KA/1s	100	
29		Water treatment plant	100A	25KA/1s	150	
30		Street & station flood lights	100A	25KA/1s	150	
31		Shaft lighting	100A	25KA/1s	40	
32		General services switch board (power house)	Station auxiliary switchboard	400A	20KA/1s	30
33			Turbine house cranes	315A	20KA/1s	70
34	Power outlet-maintenance bay		160A	20KA/1s	50	
35	Power outlet-generator floor		160A	20KA/1s	50	
36	Draft tube gallery gate hoist		160A	20KA/1s	70	
37	Runner access power outlet		160A	20KA/1s	100	

No	ORIGIN	DESTINATION	Minimum Cable continuous current rating at 690V AC & 40°C ambient temp	Minimum cable Short circuit withstand at 500V AC	Estimated Distance (meters)
38		Turbine level and runner access areas lighting	160A	20KA/ 1s	50
39		Generator level 415v outlet	50A	20KA/ 1s	50
40		Stabilizing air compressor 1	160A	20KA/ 1s	50
41		Tunnel exhaust fan	50A	20KA/ 1s	100
42		MIV air compressor 1	50A	20KA/ 1s	60
43		MIV air compressor 2	50A	20KA/ 1s	60
44		Intake gates control centre (intake gates)	Gates control unit	160A	20KA/ 1s
45	Power outlet		160A	20KA/ 1s	10
47	Screen raking gantry		50A	20KA/ 1s	20
48	Raw water supply		50A	20KA/ 1s	30
49	Spillway gates control centre (spill way gates)	Gates control unit	160A	20KA/ 1s	20
50		Crane	160A	20KA/ 1s	50
51		Power outlet	160A	20KA/ 1s	50
52		Gatehouse	50A	20KA/ 1s	50

*NB-cable lengths to and from the main station auxiliaries' switchboard may change by approx. +20m depending on the positioning of the new proposed main station auxiliaries' switchboard*

2.7.2.3 Contractor shall manufacture, test, supply, install and commission new power cables to the Lighting and small power distribution board located in each of the following switchboards; main auxiliaries' switchboard, general services switchboard, intake gates control centre and spillway gates control centre which are not listed in the table above. The length of the cables shall depend on positioning of the TPN distribution boards. The boards shall be positioned in way to allow re use of the existing lighting and socket outlet feeder circuits, where this is not possible junction boxes shall be used, or wiring replaced.

2.7.2.4 Contractor shall manufacture, test, supply, install and commission junction boxes to terminate lighting and power/socket outlets feeder cables in table above (2.7.2.2). Bimetal termination strips shall be installed in the junction boxes to terminate existing aluminium conductors (for sockets and lighting circuits using aluminium cables). All cables shall be of copper material

### 2.7.3 Excitation power cables

2.7.3.1 All power cables terminated to the existing excitation panels shall be removed and replaced with new power **copper** cables. Accurate cable lengths of existing cables are not available, bidders who wish to get the accurate lengths can visit the station and measure. The lengths given below are estimates, the approved bidder during design site visit shall collect the accurate required cable lengths, employer shall not be liable if the cables supplied by the contractor are not sufficient to connect the systems

2.7.3.2 Contractor shall manufacture, test, supply, install and commission new power cables meeting the requirements in clause 3.7 and 5.3.8. and with minimum ratings provided in the table below.

No	ORIGIN	DESTINATION	Minimum Cable rating @ 40°C ambient	Estimated distance (meters)
1	Unit 2 Excitation panels (power house)	Unit 2 Excitation transformer	1800A, 50kA/ 1s	10
2		Unit 2 Rotor brush gear	1800A DC	20
3		Power house 110V DC distribution board (cable gallery)	100A DC	30
4		Unit 2 motor control centre	50A, 20KA/ 1s	30
5	Unit 3 Excitation panels (power house)	Unit 3 Excitation transformer	1800A, 50kA/ 1s	10
6		Unit 3 Rotor brush gear	1800A DC	20
7		Power house 110V DC distribution board (cable gallery)	100A DC	30
8		Unit 3 Unit motor control centre	50A, 20KA/ 1s	30

### 2.7.4 Control & Auxiliary power supplies cables

2.7.4.1 The contractor shall remove all control and auxiliary power supply cables terminated to the existing protection, excitation and LV switchboards panels to be removed in the scope of supply in the preceding clauses. Accurate cable lengths of existing cables are not available, bidders who wish to get the accurate lengths can visit the station and measure.

2.7.4.2 Contractor shall manufacture, test, supply, install and commission new control and auxiliary supply cables as per requirements of clause 3.7 to cover all the functions required by the particular specifications.

2.7.4.3 The table below gives the estimated distances along cable routes between most of the equipment that require interfacing as per tender specifications. The distances are estimates and do not factor in cable lengths inside the panel. The approved bidder during design site visit shall collect the accurate required cable lengths, employer shall not be liable if the cables supplied by the contractor are not sufficient to connect the systems.

2.7.4.4 Approved cable and core numbering shall be established. The numbering system and material shall be submitted for approval during design stage.

No	ORIGIN	DESTINATION	Estimated distance (meters)
1	Unit 2 Excitation panels (power house)	Unit 2 Manual control panel	40
2		Unit 2 control PLC	40
3		AC/DC panel (DC control supply & power house SCADA ethernet switches)	20
4		protection panels (Control room)	220
5		Unit 2 Generator MV switchgear (proposed)	220
6		Unit 2 Excitation transformer	20
7		Unit 2 shaft earthing brush gear (proposed)	20
8	Unit 3 Excitation panels (power house)	Unit 3 Manual control panel	40
9		Unit 3 control PLC	40
10		AC/DC panel (DC control supply & power house SCADA ethernet switches)	60
11		Protection panels (Control room)	230
12		Unit 3 Generator MV switchgear (proposed)	250
13		Unit 3 Excitation transformer	20
14		Unit 3 shaft earthing brush gear (proposed)	20
15	U1 MV Switchgear (proposed- substation)	Protection panels (Control room)	90
16		Unit control PLC	230
17	U2 MV Switchgear (proposed- substation)	Protection panels (Control room)	70
18		Unit control PLC	220
19		Manual control panel	220
20		protection panels (Control room)	50

No	ORIGIN	DESTINATION	Estimated distance (meters)	
21	U3 MV Switchgear (proposed-substation)	Unit control PLC	250	
22		Manual control panel	250	
23	Protection panels (control room)	power house main wiring marshalling kiosks (power house cable gallery)	200	
24		U2 Generator neutral marshalling kiosk	230	
25		U3 Generator neutral marshalling kiosk	240	
26		U2 Unit control PLC	220	
27		U3 Unit control PLC	230	
28		U2 Manual control panel	220	
29		U3 Manual control panel	230	
30		U2 132kV CT&VT Marshalling kiosk	70	
31		U3 132kV CT&VT Marshalling kiosk	60	
		Station transformer 1 local control cubicle	90	
32		Station transformer 2 local control cubicle	70	
33		Station transformer 3 local control cubicle	50	
34		U2 132kV line VT, Isolator & earth switch Marshalling kiosks	70	
35		U3 132kV line VT, Isolator & earth switch Marshalling kiosks	60	
36		U2 GSU transformer local control cabinet	80	
37		U3 GSU transformer local control cabinet	60	
38		U2 132kV circuit breaker	70	
39		U3 132kV circuit breaker	60	
40		KPLC RTU (For Kamburu inter trips)	20	
41		Main station switch board	20	
42		DC distribution board (proposed)	30 <sup>a</sup>	
43		Alternative supply transformer local control cabinet	90	
44		EDG local control cabinet	110	
45		Protection communication cabinet (proposed)	30 <sup>a</sup>	
46		Main station switch board (control room)	Station transformer 1 local control cubicle	80
47			Station transformer 2 local control cubicle	60
48			Station transformer 3 local control cubicle	40
49			DC distribution board (proposed)	30 <sup>a</sup>
50	Alternative supply transformer local control cabinet		80	
51	EDG local control cabinet		100	
52	Common PLC		10	

No	ORIGIN	DESTINATION	Estimated distance (meters)
53		SCADA cabinet (control room SCADA ethernet switches)	20
54	Main station auxiliaries' switchboard-auxiliaries section (control room)	DC distribution board (proposed)	30 <sup>a</sup>
55		Common PLC	10 <sup>a</sup>
56		SCADA cabinet (control room SCADA ethernet switches)	20
57	General services switchboard (power house)	power house main wiring marshalling kiosks (cable gallery)	30
58		Common PLC	200
59		AC/DC panel (DC control supply & power house SCADA ethernet switches)	30
60	intake gates control centre (intake gates)	Control room main wiring marshalling kiosks	500
61		Common PLC	520
62		SCADA cabinet (control room SCADA ethernet switches)	500
63	Spill way gates control centre (spillway gates)	Control room main wiring marshalling kiosks	400
64		Common PLC	420
65		SCADA cabinet (control room SCADA ethernet switches)	400

*a- the distance with depend on positioning of the proposed panel or positioning of the main station aux switchboard*

## 4 GITARU POWER PLANT MAJOR EQUIPMENT DATA

### 4.2.1 Unit 1 Generator

*Append the table below*

NO.	Description	Rating
1	Rated power	95000kVA
2	Maximal continuous overload (temperatures rise in acc. to class F)	not applicable
3	Rated voltage	15000V
4	Operating range of voltage	±5% at rated load
5	Rated current	3657A
6	Rated frequency	50Hz
7	Rated power factor	0.85



NO.	Description	Rating	
8	Service factor	1	
9	Number of phases	3	
10	Number of poles	22	
11	Rated speed	272.7rpm	
12	Overspeed	490rpm	
13	Duty	S1	
14	Class of insulation	Stator: F Rotor: F	
15	Temperature rise for rated output (above 40°C air temperature)	Stator 85K Rotor: 80K	
16	Maximum altitude of installation	1000m	
17	Ambient temperature	40°C	
18	Rated excitation current	808A	
19	No. load excitation current	454A	
20	Rated Excitation voltage (130°C)	267V	
21	Method of excitation	Static	
22	Reactances in p.u.	Unsaturated	Saturated
	Xd	1.07	0.97
	X'd	0.24	0.22
	X''d	0.17	0.15
	Xq	0.76	
	X''q	0.22	
	X2	0.19	
	X0	0.06	
	Xσ1	0.09	
	Xp	0.12	
23	Short circuit ratio (Iko/In)	1.01p.u.	
24	Time Constants; T'do	7.80s	
	T'd	1.80s	
	T''d	0.04s	
	T''do	0.06s	
	Ta	0.19s	
	T''q	0.05s	
	T''qo	0.16s	

## **8 PARTICULAR TECHNICAL SPECIFICATION: STATION LOW VOLTAGE SWITCHBOARDS**

### **8.3.2 The main station switch board**

#### **8.3.2.1 *Switchboard requirements***

*Add the following clause*

- (h) The switchboard shall be installed on same position where the existing switchboard is installed. Size of the existing switchboard has been given in the existing equipment drawings provided. The existing main station switchboard is positioned next to main station auxiliaries' switchboard in the control room, hence availability of extra room for a longer new switchboard shall be dependent on sizing and positioning of the new main station auxiliaries switch board (see clause 8.3.3.1 (g) below)

### **8.3.3 Main Station Auxiliaries Switch Board**

#### **8.3.3.1 *Switchboard requirements***

*Add the following clause*

- (g) The new mains station auxiliaries' switchboard may be installed on position where the existing main station switchboard auxiliaries section is located or at an alternative location in the control room in front of the protection panels. The bidders shall size their switchboard for either positions as long as all requirements of the switchboard are met (it is however anticipated that the space occupied by the existing main station switchboard is not enough for the new switchboard).

If the bidder chooses the space in front of the protection panels

- (i) The available space is 4000mm X 600mm.
- (ii) The distance between the existing switchboard to this space is 10 meters

- (iii) To utilise this space a cable trench of 10000mmX800mm shall be constructed inside the control room for cable installation. The cable trench shall be similar to the control room cable trenches with tiled covers.

## 8.7 LV POWER CABLES

*Insert the following clauses*

- 8.7.3 All low voltage cables shall meet the requirements of IEC 60502 and shall be type tested to the requirements of this standard
- 8.7.4 All LV power cables shall meet the following basic ratings
- 8.7.4.1 Rated operational voltage  $U_e$ : 690VAC
  - 8.7.4.2 Rated insulation voltage: 1000VAC
  - 8.7.4.3 Rated impulse withstands voltage  $U_{imp}$ : 12KV
- 8.7.5 All Low voltage power cables shall be sized and installed as per latest BS 7671 (IET Wiring Regulations) requirements for industrial installations and other relevant IEC standards. Voltage drop above 5% shall not be allowed.
- 8.7.6 For LV switchboard feeder cables the minimum current ratings are given in clause 2.7, the cables shall be appropriately rated to above 120% of rated feeder/incomer load.

# AMENDED CLAUSES

The following clauses have been amended

CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
<b>SECTION V: SPECIFICATIONS</b>			
1.11.2.6	49	<p>Factory training programme shall be split into three modules as follows:</p> <p>(a) Protection and SCADA systems- minimum duration of 8 weeks for at least four engineers</p> <p>(b) Excitation systems- minimum duration of 8 weeks for at least four engineers</p> <p>(c) MV generator switchgear &amp; LV switchgear systems - minimum duration of 8 weeks for at least two engineers and two technicians</p>	<p>Factory training programme shall be split into three modules as follows:</p> <p>(a) Protection and SCADA systems- minimum duration of <b>4 weeks</b> for at least four engineers</p> <p>(b) Excitation systems- minimum duration of <b>4 weeks</b> for at least four engineers</p> <p>(c) MV generator switchgear &amp; LV switchgear systems - minimum duration of <b>4 weeks</b> for at least two engineers and two technicians</p>
2.2.2	63	<p>Advise the client on any requirements that are not included in the scope of the project that are necessary for successful implementation of the project. In this respect, the contractor shall determine all the DC loading requirements of the new systems and compare with the available capacity. They shall then advise the employer on any necessary change to the Station DC system that is not part of the project scope e.g. chargers and batteries</p>	<p><b>Carryout power system analysis studies detailed in clause 1.8.3.</b></p> <p>Advise the client on any requirements that are not included in the scope of the project that are necessary for successful implementation of the project. In this respect, the contractor shall determine all the DC loading requirements of the new systems and compare with the available capacity. They shall then advise the employer on any necessary change to the Station DC system that is not part of the project scope e.g. chargers and batteries</p>
2.3.7.1	72	<p>Contractor shall manufacture, test, supply, install and commission 2 (two) (one for each unit) Shaft Brush gear with all associated devices for generator shaft earthing and rotor earth fault sensing.</p>	<p>Contractor shall manufacture, test, supply, install and commission 2 (two) (one for each unit) Shaft Brush gear with all associated devices for generator shaft earthing, <b>shaft current protection</b> and rotor earth fault sensing.</p>

CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
2.4.3(d)	77	Three (3) voltage transformers each with three secondary cores	six (6) voltage transformers, two for each phase, each with two secondary cores
2.5.8 (3)	88	2(two) Station transformer & EDG numerical protection relays	2(two) protection IED's for Station transformer, alternative supply transformer & EDG protection <b>if</b> they are they are the same type or model (if they are interchangeable) <b>else</b> 1(one) of each type of protection IED's for Station transformer, alternative supply transformer & EDG protection
2.6.2.2(a)(v)	91	1(one) earth switch	deleted
2.6.2.2(d)	93	New low voltage copper power cables for: (i) The three station transformers, alternative supply transformer and emergency diesel generator main station switchboard incomers. (ii) Any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	New low voltage copper power cables for all feeders and incomers
2.6.3.1	93-95	Shall contain the following: see table page 93-95	Shall contain the following: <i>see table below (page 25-26)</i>
2.6.3.2(a)(vii)	96	2(two) earth switches	deleted
2.6.3.2(a)(iii)	96	A mechanical interlocking device	deleted
2.6.3.2(c)	97	New LV copper power cables shall be installed for: (i) The two incomer supplies from the main station switch board (ii) Connecting the three station transformers & MV switch gear and alternative supply transformer & emergency diesel generator feeder circuits to the distribution boards at the substation. (iii) Any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	New low voltage copper power cables for all feeders and incomers
2.6.3.2(b)(iv)	97	7(seven) 125A standard sized withdrawable cable feeder modules with	<b>Eleven (11)</b> 125A standard sized withdrawable cable feeder modules with all the devices as specified in

CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
		all the devices as specified in clause 8.6.9 of particular specifications	clause 8.6.9 of particular specifications
2.6.4.2(a) (iii)	100	A mechanical interlocking device	deleted
2.6.4.2(a) (ix)	101	2(two) earth switches	deleted
2.6.4.2(d)	102	New LV copper power cables shall be installed for any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	New low voltage copper power cables to be supplied and installed for all feeders and incomers
2.6.5.3(a) (vi)	104	2(two) earth switches	deleted
2.6.5.3(a) (iii)	104	A mechanical interlocking device	deleted
2.6.5.4	105	New LV copper power cables shall be installed for any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	New low voltage copper power cables to be supplied and installed for all feeders and incomers
2.6.6.3(a) (vi)	107	2(two) earth switches	deleted
2.6.6.3(a) (iii)	107	A mechanical interlocking device	deleted
2.6.6.4	108	New LV copper power cables shall be installed for any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	New low voltage copper power cables to be supplied and installed for all feeders and incomers
2.6.9 (24)	110	1 (one) switchboard earth switch of each type and rating	deleted
2.6.9 (25)	110	1 (one) incomer mechanical interlocking device of each type	deleted
5.3.2.1(f)	170	Converter shall be removable while the generator is operational	<b>The power converter shall be withdrawable i.e. draw out type that can be removed and re-inserted while the generator is online.</b>
8.3.2.2(g)	403	Each incomer shall have an earth switch for earthing the incomer when under maintenance. The earth switch shall have a mechanical interlock to ACB to prevent closing the earth switch to the bus bar. The earth switch shall be compliant with all specifications in clause 8.6.2	deleted

CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
8.3.2.3(e)	404	shall have two earth switches for earthing each bus section when under maintenance. The earth switch shall have a mechanical interlock to ACB to prevent closing the earth switch to the bus bar. It shall also have a trapped key electrical or any other type of electrical interlock to prevent closing earth switch to a live bus bar. The earth switch shall be compliant with all specifications in clause 8.6.2	deleted
8.3.2.5(a)(ii)	407	Any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	All feeder circuits power cables
8.3.2.5(b)(i)	407	Rated continuous current at 40°C ambient temperature • Incomer cables: 1600A • Other: as per feeder rating	Rated continuous current at 40°C ambient temperature shall be as per table in clause 2.7.2.2
8.3.3.1(b)	409-411	The following incomers and feeder circuits with the indicated switchgear ratings shall be provided in the new switch board: see table page 409-411	The following incomers and feeder circuits with the indicated switchgear ratings shall be provided in the new switch board: <b><i>see new table below (page 25-26)</i></b>
8.3.3.2(g)	412	Each incomer shall have an earth switch for earthing the incomer when under maintenance. The earth switch shall have a mechanical interlock to ACB to prevent closing the earth switch to the bus bar. The earth switch shall be compliant with all specifications in clause 8.6.2	deleted
8.3.3.3(c)(iv)	415	7(seven) 125A standard sized withdrawable cable feeder modules meeting requirements of clause 8.6.9	<b>Eleven (11)</b> 125A standard sized withdrawable cable feeder modules meeting requirements of clause 8.6.9
8.3.3.8(a)(iii)	418	Any feeder circuit power cable that might require replacement due to the positioning and size of the new switch board	All other feeder circuits power cables
8.3.3.8(b)(i)	418	Rated continuous current at 40°C ambient temperature • Incomer cables: 1600A • Station transformer & MV switchgear feeder circuits: 100A • Other: as per feeder rating	Rated continuous current at 40°C ambient temperature shall be as per table in clause 2.7.2.2

CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
8.3.4.2(f)	422	Each incomer shall have an earth switch for earthing the incomer when under maintenance. The earth switch shall have a mechanical interlock to ACB open status to prevent closing the earth switch to the bus bar. The earth switch shall be compliant with all specifications in clause 8.6.2	deleted
8.3.4.2(b)(iii)	422	Mechanical interlocking between the contactors shall be provided	deleted
8.3.5.2(b)(iii)	431	Mechanical interlocking between the contactors shall be provided	deleted
8.3.5.2(f)	432	Each incomer shall have an earth switch for earthing the incomer when under maintenance. The earth switch shall have a mechanical interlock to ACB open status to prevent closing the earth switch to the bus bar. The earth switch shall be compliant with all specifications in clause 8.6.2	deleted
8.3.5.3(a)	432	A minimum of the following control, metering & protection devices and functions shall be provided: (i).... (x)	<b>A control &amp; metering compartment shall be provided housing</b> a minimum of the following control, metering & protection devices and functions: (i).... (x)
8.3.5.3(b)(ii)	432	The digital AC voltmeter shall be flash mounted on the incomer cubicle	The digital AC voltmeter shall be flash mounted on the <b>control and metering compartment</b>
8.3.6.2(b)(iii)	438	Mechanical interlocking between the contactors shall be provided	deleted
8.3.6.2(f)	439	Each incomer shall have an earth switch for earthing the incomer when under maintenance. The earth switch shall have a mechanical interlock to ACB open status to prevent closing the earth switch to the bus bar. The earth switch shall be compliant with all specifications in clause 8.6.2	deleted
8.3.6.3(a)	439	A minimum of the following control, metering & protection devices and functions shall be provided: (i).... ..... (x)	<b>A control &amp; metering compartment shall be provided housing</b> a minimum of the following control, metering & protection devices and functions: (i).... ..... (x)



CLAUSE NO.	Page in tender	TENDER ARTICLE	AMENDED ARTICLE
8.3.6.3(b)(ii)	439	The digital AC voltmeter shall be flash mounted on the incomer cubicle	The digital AC voltmeter shall be flash mounted on the <b>control and metering compartment</b>
8.5.6.1	460	The bus bars shall be single and air insulated. The bus bars and connections shall be made of high conductivity, high grade copper, and shall be in unit lengths.	The bus bars and connections shall be made of high conductivity, high grade copper, and shall be in unit lengths.
8.6.9.8(a)	478	63A MPCB meeting requirements in clause 8.6.5	80A MPCB meeting requirements in clause 8.6.6

The Amended Main station auxiliaries' requirements table clause 2.6.3.1 and 8.3.3.1(b)

INCOMER CUBICLE/S (one/two) - One existing						
	Incomer cubicle/s	Incomer rating		Type	ACB rating	
1	Duty bus section incomer	630A		Incomer	800A	
2	Reserve bus section incomer	630A			800A	
FEEDER CUBICLES (two/three/four)- Four existing						
Standard sized plug in modules						
	Feeder cubicle compartments	Module rating		module Type	MCCB rating	Contactor rating
1	Dewatering pump 1	125A	55KW	DOL Motor starter	160A	75KW
2	Dewatering pump 2	125A	55KW	DOL Motor starter	160A	75KW
3	Dewatering pump 3	125A	55KW	DOL Motor starter	160A	75KW
4	Spare	125A	55KW	DOL Motor starter	160A	75KW
5	Ventilation fan1	250A		Cable feeder	315A	N/A
6	Ventilation fan2	250A		Cable feeder	315A	N/A
7	spare	250A		Cable feeder	315A	N/A
8	110V Battery charger	125A		Cable feeder	160A	N/A
9	50V Battery charger	125A		Cable feeder	160A	N/A
10	Power outlet 1	125A		Cable feeder	160A	N/A
11	Power outlet 2	125A		Cable feeder	160A	N/A
12	Lift supply	125A		Cable feeder	160A	N/A
13	Control & office buildings supply board	125A		Cable feeder	160A	N/A
14	Unit 1 generator transformer kiosk	125A		Cable feeder	160A	N/A
15	Unit 2 generator transformer kiosk	125A		Cable feeder	160A	N/A
16	Unit 3 generator transformer kiosk	125A		Cable feeder	160A	N/A
17	spare	125A		Cable feeder	160A	N/A
18	spare	125A		Cable feeder	160A	N/A
Small sized or Standard sized plug in modules						
	Feeder cubicle compartments	Module rating		Module Type	MPCB rating	Contactor rating
19	Air conditioning board	63A		Cable feeder	80A	N/A
20	UPS supply1	63A		Cable feeder	80A	N/A
21	UPS supply2	63A		Cable feeder	80A	N/A
22	spare	63A		Cable feeder	80A	N/A
23	spare	63A		Cable feeder	80A	N/A

24	Unit 1 station transformer & MV switchgear supply	32A		Cable feeder	32A	N/A
25	Unit 2 station transformer & MV switchgear supply	32A		Cable feeder	32A	N/A
26	Unit 3 station transformer & MV switchgear supply	32A		Cable feeder	32A	N/A
27	EDG & Alternative supply transformer auxiliary supply	32A		Cable feeder	32A	N/A
28	spare	32A		Cable feeder	32A	N/A
29	Water treatment plant	63A	32KW	DOL Motor starter	80A	37KW
30	Street & station flood lights	63A	32KW	DOL Motor starter	80A	37KW
31	Shaft lighting	63A	32KW	DOL Motor starter	80A	37KW
32	spare	63A	32KW	DOL Motor starter	80A	37KW
<b>Control &amp; office buildings supply distribution/panel board compartment</b>						
	Feeder circuit	Type		MPCB rating	MCB rating	
1	Switch room	Three phase circuit		32A	N/A	
2	Ventilating room	Three phase circuit		32A	N/A	
3	spare	Three phase circuit		32A	N/A	
4	spare	Three phase circuit		32A	N/A	
5	lift and cable room	Single phase circuit		N/A	15A	
6	corridors	Single phase circuit		N/A	15A	
7	External area	Single phase circuit		N/A	15A	
8	Services and battery room	Single phase circuit		N/A	15A	
9	office	Single phase circuit		N/A	15A	
10	Ventilating room ring main No 3	Single phase circuit		N/A	32A	
11	Services and office rooms ring main No 2	Single phase circuit		N/A	32A	
12	Switch room ring main No.1	Single phase circuit		N/A	32A	
13	spare	Single phase circuit		N/A	32A	
14	spare	Single phase circuit		N/A	15A	
<b>Switchboard Basic rating</b>						
1	Main busbar rating In			800A		
2	Distribution busbar rating In			500A		
3	Switchboard short-time withstand current(Icw)			>50KA/ 1s		
4	Rated operating voltage			690V AC		

**ACKNOWLEDGEMENT OF ADDENDUM NO. 3**

We, the undersigned hereby certify that the addendum is an integral part of the document and the alterations set out in this addendum have been incorporated in the tender proposal.

Signed.....

Tenderer.....

Date.....