

## Notice to all Bidders

RE: ADDENDUM NO. 4: AMENDMENT OF BIDDING DOCUMENT

**Contract Title:** Design, supply, installation and commissioning of the 400/220 kV Kimuka Substation and Associated Transmission Lines

**Contract No.:** KE-KETRACO-416094-CW-RFB

In accordance with the Instructions to Bidders ITB 8 [Amendment of Bidding Document], the Employer, *Kenya Electricity Transmission Company Ltd. (KETRACO)* has amended the following sections/parts of the issued Bidding Document:

1. Section II - Bid Data Sheet, Clause ITB 11.3(d) which reads as shown below:

<b>ITB 11.3(d)</b>	The Bidder shall submit the following additional documents in the Financial Part of its Bid: <b>Source of labor and materials indices, source of exchange rates and the base date indices, percentage of fixed element in Contract price (a = %), percentage of labor component in Contract price (b= %), and percentage of material and equipment component in Contract price (c= %) in line with Appendix 2 (Price Adjustment) of the Contract Agreement.</b>
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has been revised as follows:

<b>ITB 11.3(d)</b>	The Bidder shall submit the following additional documents in the Financial Part of its Bid: <b>Not Applicable</b>
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2. Section V - Eligible Countries which reads as shown below:

In reference to ITB 4.8 and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this Bidding process:

Under ITB 4.8 (a) and 5.1: [insert a list of the countries following approval by the Bank to apply the restriction or indicate "none"].

Under ITB 4.8 (b) and 5.1: [insert a list of the countries following approval by the Bank to apply the restriction or indicate "none"]

has been revised as follows:

In reference to ITB 4.8 and 5.1, for the information of the Bidders, at the present time firms, goods and services from the following countries are excluded from this Bidding process:

Under ITB 4.8 (a) and 5.1: none

Under ITB 4.8 (b) and 5.1: none

3. Section III – Evaluation and Qualification Criteria clause 1.4 Subcontractor/Manufacturers, which reads as shown below

#### 1.4 Subcontractors/Manufacturers

Item No.	Description of Item	Minimum Criteria to be met by Manufacturer	Document Submission Requirement
1	400 kV switchyard equipment	<ul style="list-style-type: none"> <li>i. 15 years manufacturing experience of 380 kV or above of switchyard equipment.</li> <li>ii. 400 kV or above switchyard equipment being in successful operation for at least three (3) years as of the date of bid opening. The operational experience shall be supported by end-user certificates from at least three (3) utilities/clients* with comprehensive contact details.</li> <li>iii. Supplied at least one hundred (100) units per year with 400 kV or above rating over the last ten (10) years, supported by end-user certificates/letters from the utilities/clients* with comprehensive contact details.</li> <li>iv. Supplied at least fifty (50) units of 400 kV or above outside the manufacturer's home country in the last five (5) years, supported by end-user certificates/letters from the utilities/clients* with comprehensive contact details.</li> </ul>	<ul style="list-style-type: none"> <li>• Reference list</li> <li>• End-user certificates/letter</li> <li>• Manufacturers' Authorization letter</li> <li>• Proof of implementation of ISO 9001</li> <li>• List of performed type tests and type tests reports as per the requirements in the Technical Specifications</li> <li>• Technical data sheets</li> <li>• Drawings</li> <li>• Catalogue and other technical documents</li> </ul> <p>Note that all the above documents need to be in English or translated to English by an authorized and notarized agent.</p> <p>*Clients shall include EPC contractors.</p>
2	220kV Switchyard equipment	<ul style="list-style-type: none"> <li>i. 15 years manufacturing experience of 220kV or above of switchyard equipment.</li> <li>ii. 220kV or above switchyard equipment being in successful operation for at least three (3) years as of the date of bid opening. The operational experience shall be supported by end-user certificates from at least three (3) utilities/clients* with comprehensive contact details.</li> </ul>	<ul style="list-style-type: none"> <li>• Reference list</li> <li>• End-user certificates/letter</li> <li>• Manufacturers' Authorization letter</li> <li>• Proof of implementation of ISO 9001</li> <li>• List of performed type tests and type tests reports as per</li> </ul>

		<p>iii. Supplied at least one hundred (100) units per year with 220 kV or above rating over the last ten (10) years, supported by end-user certificates/letters from the utilities/clients* with comprehensive contact details.</p> <p>iv. Supplied at least fifty (50) units of 220kV or above outside the manufacturer's home country in the last five (5) years, supported by end-user certificates/letters from the utilities/clients* with comprehensive contact details.</p>	<p>the requirements in the Technical Specifications</p> <ul style="list-style-type: none"> <li>• Technical data sheets</li> <li>• Drawings</li> <li>• Catalogue and other technical documents</li> </ul> <p>Note that all the above documents need to be in English or translated to English by an authorized and notarized agent.</p> <p>*Clients shall include EPC contractors.</p>
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Has been revised as follows:

#### 1.4 Subcontractors/Manufacturers

Item No.	Description of Item	Minimum Criteria to be met by Manufacturer	Document Submission Requirement
1	400 kV switchyard equipment	<p>i. 15 years manufacturing experience of 380 kV or above of switchyard equipment.</p> <p>ii. 400 kV or above switchyard equipment being in successful operation for at least three (3) years as of the date of bid opening. The operational experience shall be supported by end-user certificates from at least three (3) utilities/clients* out of which one (1) must be out of the manufacturer's home country with comprehensive contact details.</p>	<ul style="list-style-type: none"> <li>• Reference list</li> <li>• End-user certificates/letter</li> <li>• Manufacturers' Authorization letter</li> <li>• Proof of implementation of ISO 9001</li> <li>• List of performed type tests and type tests reports as per the requirements in the Technical Specifications</li> <li>• Technical data sheets</li> <li>• Drawings</li> <li>• Catalogue and other technical documents</li> </ul>

			<p>Note that all the above documents need to be in English or translated to English by an authorized and notarized agent.</p> <p>*Clients shall include EPC contractors.</p>
2	220kV Switchyard equipment	<p>i. 15 years manufacturing experience of 220kV or above of switchyard equipment.</p> <p>ii. 220kV or above switchyard equipment being in successful operation for at least three (3) years as of the date of bid opening. The operational experience shall be supported by end-user certificates from at least three (3) utilities/clients* out of which one (1) must be out of the manufacturer's home country with comprehensive contact details.</p>	<ul style="list-style-type: none"> <li>• Reference list</li> <li>• End-user certificates/letter</li> <li>• Manufacturers' Authorization letter</li> <li>• Proof of implementation of ISO 9001</li> <li>• List of performed type tests and type tests reports as per the requirements in the Technical Specifications</li> <li>• Technical data sheets</li> <li>• Drawings</li> <li>• Catalogue and other technical documents</li> </ul> <p>Note that all the above documents need to be in English or translated to English by an authorized and notarized agent.</p> <p>*Clients shall include EPC contractors.</p>

4. Section VII - Employer's Requirements- E – Schedules of Technical Information, x) Low voltage cables, item 1.8, 1.11, 2.7, 2.8 and 2.12 which read as shown below:

x) LOW VOLTAGE CABLES	UNIT	DATA	
		REQUIRED	OFFERED



String Insulators				
1.8	Type and thickness of inner sheath material	mm	extruded P.V.C	
1.1 1	Type and thickness of outer sheath material	mm	extruded P.V.C	
2.7	Insulation material		P.V.C or X.L.P.E	
2.8	Material and thickness of inner sheath	mm	extruded P.V.C	
2.1 2	Material and thickness of outer sheath	mm	extruded P.V.C	

have been revised as follows:

x) LOW VOLTAGE CABLES		UNIT	DATA	
			REQUIRED	OFFERED
	String Insulators			
1.8	Type and thickness of inner sheath material	mm	LSZH	
1.1 1	Type and thickness of outer sheath material	mm	LSZH	
2.7	Insulation material		X.L.P.E	
2.8	Material and thickness of inner sheath	mm	LSZH	
2.1 2	Material and thickness of outer sheath	mm	LSZH	

5. Section VII - Employer's Requirements- E – Schedules of Technical Information, g) 11kV XLPE Insulated Cable System (with solid bonding), item 1.5, 4.8 and 4.10 which read as shown below:

g) 11kV XLPE INSULATED CABLE SYSTEM (with solid bonding)		UNIT	DATA	
			REQUIRED	OFFERED
1.5	General description of cable		Should be Filled By Tenderer	
	over sheath type		MDPE	
4.8	Bedding/Binder tape			
	Type and material		Should be Filled By Tenderer	

4.10	Protective anti-corrosion external sheath covering			
	-Type and material		MDPE	

have been revised as follows:

g) 11kV XLPE INSULATED CABLE SYSTEM (with solid bonding)		UNIT	DATA	
			REQUIRED	OFFERED
1.5	General description of cable		Should be Filled By Tenderer	
	over sheath type		LSZH	
4.8	Bedding/Binder tape			
	Type and material		LSZH	
4.10	Protective anti-corrosion external sheath covering			
	-Type and material		LSZH	

6. Section VII. Employer's Requirements- B – Specifications, clause 19.2.1, 19.2.7 and 19.5 which read as shown below:

**19.2.1. General**

The 11kV XLPE insulated cable shall comprise a circular stranded Copper conductor insulated by a continuous vulcanization, triple extrusion process, simultaneously applying a semiconducting conductor screen, a thermosetting insulating dielectric and a semiconducting core screen. The extruded core shall be cured using a dry curing process and the byproducts of crosslinking removed by a prolonged degassing process. The core shall be sheathed overall with an extruded lead sheath and protected with a continuously extruded polymeric oversheath. A thin layer of graphite or semi-conducting polymer shall be applied overall and firmly bonded to permit testing of the cable oversheath.

**19.2.7. Metallic Sheath**

The sheath is required to fulfill the following requirements:

- provide a radial watertight barrier to the ingress of moisture into the extruded cable core,
- provide a low resistance path for cable charging current,
- provide protection against minor accidental damage caused by third party interference with cable during installation and service and
- be capable of sustaining the specified earth fault currents for the time stipulated by the user.

The water impervious sheath shall consist of a seamless and continuously extruded tube of lead alloy. The lead alloy used for the sheath shall be alloy 1/2C. A thin layer of bitumen shall be applied over the sheath.

Lead alloy sheath of best quality metal, free from pinhole flaws and other imperfections shall be tightly extruded over the water blocking layer.

The minimum thickness at any point shall not fall below the specified nominal thickness by more than 0.1mm or 5% of the nominal thickness.

For the purpose of increasing the total short circuit current rating of the cable, a copper wire screen of suitable cross sectional area may be applied between the core bedding layer and the lead sheath. A copper tape shall be applied directly over the copper wires in an opposite lay to the lay of the copper wires, to ensure equal current sharing in the copper wire screen. A suitable binder tape shall be applied over the copper wire screen

#### **19.5. Packing, Shipping and Transport**

Each length of the finished cable shall be wound into a steel drum, and each end of a cable shall be sealed hermetically before shipment. The drum shall be lagged with strong closely fitting battens, which shall be securely fixed to prevent damage to the cable. The reels and lagging shall be sufficiently strong to withstand the conditions of shipment. All wooden parts shall be appropriately treated for protection against vermin.

The cable drums shall be arranged to take a round spindle and shall have smooth internal flanges to accommodate an equal number of turns per layer.

Any cable end, which is left projecting from the drum, shall be protected against damage.

Each drum shall bear a distinguishing number for identification purposes painted on the outside of the steel flange.

Each reel shall be marked with the following particulars:

- 1) Type of cable;
- 2) Direction of rolling;
- 3) Rated voltage and conductor size;
- 4) Reel length;
- 5) Cable net weight and gross weight;
- 6) Name of manufacturer/trade work;
- 7) Year of manufacture;
- 8) Contract No.

Shipping reels shall be free of any information not pertaining to the order.

The ends of lead sheathed cables shall be sealed by pluming a cap or disc on the lead sheath. The ends of PVC sheathed cables shall be suitably sealed to prevent the ingress of moisture.

The drums shall be of good quality and care must be taken to ensure that cables are not damaged during shipping, storage etc. The gross weight of the loaded drum should be suitable for handling by KETRACO's cable drum trailer during maintenance.

**have been revised as follows:**

#### **19.2.1. General**

The 11kV XLPE insulated cable shall comprise a circular stranded Copper conductor insulated by a continuous vulcanization, triple extrusion process, simultaneously applying a semiconducting conductor screen, a thermosetting insulating dielectric and a semiconducting core screen. The extruded core shall be cured using a dry curing process and the byproducts of crosslinking removed by a prolonged degassing process. The core shall be sheathed overall with an extruded aluminium sheath and protected with a continuously extruded polymeric (low smoke zero halogen) oversheath. A thin layer of graphite or semi-conducting polymer shall be applied overall and firmly bonded to permit testing of the cable oversheath.

#### **19.2.7. Metallic Sheath**

The sheath is required to fulfill the following requirements:

- a. provide a radial watertight barrier to the ingress of moisture into the extruded cable core,
- b. provide a low resistance path for cable charging current,
- c. provide protection against minor accidental damage caused by third party interference with cable during installation and service and
- d. be capable of sustaining the specified earth fault currents for the time stipulated by the user.

The water impervious sheath shall consist of a seamless and continuously extruded tube of aluminium . A thin layer of bitumen shall be applied over the sheath.

Aluminium of best quality metal, free from pinhole flaws and other imperfections shall be tightly extruded over the water blocking layer.

The minimum thickness at any point shall not fall below the specified nominal thickness by more than 0.1mm or 5% of the nominal thickness.

For the purpose of increasing the total short circuit current rating of the cable, a copper wire screen of suitable cross sectional area may be applied between the core bedding layer and the aluminium sheath. A copper tape shall be applied directly over the copper wires in an opposite lay to the lay of the copper wires, to ensure equal current sharing in the copper wire screen. A suitable binder tape( Iszh type) shall be applied over the copper wire screen

#### **19.5. Packing, Shipping and Transport**

Each length of the finished cable shall be wound into a steel drum, and each end of a cable shall be sealed hermetically before shipment. The drum shall be lagged with strong closely fitting battens, which shall be securely fixed to prevent damage to the cable. The reels and lagging shall be sufficiently strong to withstand the conditions of shipment. All wooden parts shall be appropriately treated for protection against vermin.

The cable drums shall be arranged to take a round spindle and shall have smooth internal flanges to accommodate an equal number of turns per layer.

Any cable end, which is left projecting from the drum, shall be protected against damage.

Each drum shall bear a distinguishing number for identification purposes painted on the outside of the steel flange.

Each reel shall be marked with the following particulars:

- 1) Type of cable;
- 2) Direction of rolling;
- 3) Rated voltage and conductor size;
- 4) Reel length;
- 5) Cable net weight and gross weight;
- 6) Name of manufacturer/trade work;
- 7) Year of manufacture;
- 8) Contract No.

Shipping reels shall be free of any information not pertaining to the order.

The ends of aluminium sheathed cables shall be sealed by plumbing a cap or disc on the lead sheath. The ends of LSZH sheathed cables shall be suitably sealed to prevent the ingress of moisture.

The drums shall be of good quality and care must be taken to ensure that cables are not damaged during shipping, storage etc. The gross weight of the loaded drum should be suitable for handling by KETRACO's cable drum trailer during maintenance.

7. Section III – Evaluation and Qualification Criteria, page 72, clause 2 Evaluation, item 2.4  
Litigation History which reads as shown below:

<b>2.4 Litigation History</b>	No consistent history of court/arbitral award decisions against the Bidder <sup>1</sup> since 1 <sup>st</sup> January 2009.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON –
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has been revised as follows:

<b>2.4 Litigation History</b>	No consistent history of court/arbitral award decisions against the Bidder <sup>1</sup> since 1 <sup>st</sup> January 2019.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON –
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8. Section VII. Employer's Requirements- B – Specifications, clause 3.2.1 which reads as follows:

### **3.2. Circuit Breakers and Operating Mechanisms**

#### **3.2.1. Circuit Breakers**



The AIS-open terminal SF6 gas insulated circuit breakers shall be the single-pressure puffer or self-blast or self-blast/rotating arc type, suitable for outdoor installation. They shall be of modern design, reliable and fit for purpose. Pre-insertion resistors to be provided if found necessary as result of the insulation coordination studies that are to be provided.

The circuit breakers shall be designed and fully type tested in accordance with IEC 62271-100, IEC 62271-1, IEC 62271-101, IEC 62271-110, IEC 60270, IEC 60480, IEC 60691 and IEC 60815 and with the requirements of this Specification and shall be suitable for minimum continuous current at an ambient temperature of +40o C.

External parts of the circuit breakers which are under continuous electrical stress shall be of porcelain. The type and the profile of the porcelain insulator shed shall be suitable for the worst environmental conditions specified in the schedules. The creepage and flashover distances of the insulators shall be dimensioned to suit the outdoor service conditions specified in the Schedules.

The design of the circuit breaker shall be such that inspection and replacement of contacts, nozzles and any worn or damaged component can be carried out quickly and easily.

The maximum pole scatter during makes shall be less than 3.3ms and during opening shall be less than 3ms.

The inherent design of the circuit breakers shall be such that one set of contacts and nozzle (or nozzles as the case may be) shall be able to successfully interrupt at least twenty 100% fault currents without excessive erosion. The inherent design of these circuit breakers shall be that when switching capacitive (capacitor banks) and inductive (including reactors) currents, they produce very low over voltages. The over voltages produced on any switching duty must be considerably less than (<<) 2.5p.u.

The sound pressure levels of the circuit breakers during the mechanical operations shall comply with the local and national health and safety regulations.

A suitably quantity of molecular sieve shall be used in the circuit breaker tank to absorb any moisture, SF6 degradation product and any contaminant for at least ten years in service.

The circuit breakers shall be suitable for at least 10,000 satisfactory open and close mechanical operations in accordance with IEC 62271-100.

Circuit breakers shall be single-pole SF6 gas insulated design, suitable for high-speed single phase or three-pole auto-reclose operations. The circuit breakers shall be supplied with a single-pole re-close facility and be equipped with duplicate trip coils. The circuit breakers shall be capable of parallel tripping, when installed in the breaker and a half configuration, without delaying the tripping of either breaker. Circuit breakers shall be electrically and mechanically trip free with either or both of the duplicate trip circuits connected.

The circuit breaker shall be fitted with the open/closed position indicator easily visible from ground level.

The 400kV circuit breakers shall be equipped with Point on Wave Switch (POW) to open or close breakers at a pre-determined point on the voltage waveform.

A lock out and tripping feature shall be incorporated to prevent operation of the circuit breaker whenever the gas pressure falls to a value below, which it would be incapable of performing in accordance with its rated duty. Gas monitors shall be temperature compensated.

An alarm feature shall also be incorporated to give an indication of falling gas pressure prior to lockout of the circuit breaker. The rate of gas leakage per annum shall be guaranteed and shall not be greater than 1% for any compartment. The system of gas monitoring shall be temperature compensated and shall be to the approval of KETRACO.

The 400kV circuit breakers shall be equipped with online monitoring (OLM) system. The OLM system shall monitor following data (but not limited to):

- Internal temperature
- Power supply voltage and current
- Coil circuit and operating currents
- Motor circuit, operation current and time
- Operating times
- Time between operations
- Monitoring equipment functions (watchdog)

The OLM system shall monitor following functions (but not limited to):

- Status signals (circuit-breaker open or closed)
- Closing operation
- Opening operation
- Close-open operation
- Motor operation

The following parameters should be derived and supervised from the function categories:

- Operating times
- Operating speeds
- Coil armature time
- Coil peak current
- Damping time
- Over travel and rebound
- Counters recording the number of operations and number of motor operations;
- Motor peak current and spring charging time;
- Internal temperature of the operating mechanism;
- Ambient temperature;
- Power supply voltages and currents (OLM and heaters);
- SF6 density, with trend analysis;
- Contact wear (optional);
- Contact stroke and contact position.

OLM of Circuit breaker shall be designed as per working conditions and installation environment prevailing across KENYA. It shall be suitable to work up to ambient temperature of +50°C and RH 95%;



Circuit breaker monitoring system shall provide continuous on line monitoring of the CB by integrating the sensors at the CB and it shall be able to communicate with the central OLM system through the substation OLM data concentrator or otherwise. It shall be able to communicate with available communication protocols at KETRACO and IEC 61850. Contractor shall integrate the same to the KETRACO OLM system. The software should be delivered with the OLM and it contains a feature for automatic update of the software.

Bidder shall submit specifications / technical details of FO cables, Coaxial cables, fiber optic cables, computers, OLM software, printer and MODEM etc. for approval during detailed engineering stage

has been revised as follows:

### **3.2. Circuit Breakers and Operating Mechanisms**

#### **3.2.1. Circuit Breakers**

The AIS-open terminal SF6 gas insulated circuit breakers shall be the single-pressure puffer or self-blast or self-blast/rotating arc type, suitable for outdoor installation. They shall be of modern design, reliable and fit for purpose. Pre-insertion resistors to be provided if found necessary as result of the insulation coordination studies that are to be provided.

The circuit breakers shall be designed and fully type tested in accordance with IEC 62271-100, IEC 62271-1, IEC 62271-101, IEC 62271-110, IEC 60270, IEC 60480, IEC 60691 and IEC 60815 and with the requirements of this Specification and shall be suitable for minimum continuous current at an ambient temperature of +40o C. External parts of the circuit breakers which are under continuous electrical stress shall be of porcelain. The type and the profile of the porcelain insulator shed shall be suitable for the worst environmental conditions specified in the schedules. The creepage and flashover distances of the insulators shall be dimensioned to suit the outdoor service conditions specified in the Schedules.

The design of the circuit breaker shall be such that inspection and replacement of contacts, nozzles and any worn or damaged component can be carried out quickly and easily.

The maximum pole scatter during makes shall be less than 3.3ms and during opening shall be less than 3ms.

The inherent design of the circuit breakers shall be such that one set of contacts and nozzle (or nozzles as the case may be) shall be able to successfully interrupt at least twenty 100% fault currents without excessive erosion. The inherent design of these circuit breakers shall be that when switching capacitive (capacitor banks) and inductive (including reactors) currents, they produce very low over voltages. The over voltages produced on any switching duty must be considerably less than (<<) 2.5p.u.

The sound pressure levels of the circuit breakers during the mechanical operations shall comply with the local and national health and safety regulations.

A suitable quantity of molecular sieve shall be used in the circuit breaker tank to absorb any moisture, SF6 degradation product and any contaminant for at least ten years in service.

The circuit breakers shall be suitable for at least 10,000 satisfactory open and close mechanical operations in accordance with IEC 62271-100.

Circuit breakers shall be single-pole SF6 gas insulated design, suitable for high-speed single phase or three-pole auto-reclose operations. The circuit breakers shall be supplied with a single-pole re-close facility and be equipped with duplicate trip coils. The circuit breakers shall be capable of parallel tripping, when installed in the breaker and a half configuration, without delaying the tripping of either breaker. Circuit breakers shall be electrically and mechanically trip free with either or both of the duplicate trip circuits connected.

The circuit breaker shall be fitted with the open/closed position indicator easily visible from ground level.

The 400kV circuit breakers shall be equipped with Point on Wave Switch (POW) to open or close breakers at a pre-determined point on the voltage waveform.

A lock out and tripping feature shall be incorporated to prevent operation of the circuit breaker whenever the gas pressure falls to a value below, which it would be incapable of performing in accordance with its rated duty. Gas monitors shall be temperature compensated.

An alarm feature shall also be incorporated to give an indication of falling gas pressure prior to lockout of the circuit breaker. The rate of gas leakage per annum shall be guaranteed and shall not be greater than 1% for any compartment. The system of gas monitoring shall be temperature compensated and shall be to the approval of KETRACO.

The 400kV and 220 kV circuit breakers shall be equipped with online monitoring (OLM) system. The OLM system shall monitor following data (but not limited to):

- Internal temperature
- Power supply voltage and current
- Coil circuit and operating currents
- Motor circuit, operation current and time
- Operating times
- Time between operations
- Monitoring equipment functions (watchdog)

The OLM system shall monitor following functions (but not limited to):

- Status signals (circuit-breaker open or closed)
- Closing operation
- Opening operation
- Close-open operation
- Motor operation

The following parameters should be derived and supervised from the function categories:

- Operating times
- Operating speeds
- Coil armature time

- Coil peak current
- Damping time
- Over travel and rebound
- Counters recording the number of operations and number of motor operations;
- Motor peak current and spring charging time;
- Internal temperature of the operating mechanism;
- Ambient temperature;
- Power supply voltages and currents (OLM and heaters);
- SF6 density, with trend analysis;
- Contact wear (optional);
- Contact stroke and contact position.

OLM of Circuit breaker shall be designed as per working conditions and installation environment prevailing across KENYA. It shall be suitable to work up to ambient temperature of +50°C and RH 95%;

Circuit breaker monitoring system shall be required to have a software for data visualisation and data storage at the substation level and the same should also be integrated into SCADA system.

Circuit breaker monitoring system shall provide continuous on line monitoring of the CB by integrating the sensors at the CB and it shall be able to communicate with the central OLM system through the substation OLM data concentrator or otherwise. It shall be able to communicate with available communication protocols at KETRACO and IEC 61850. Contractor shall integrate the same to the KETRACO OLM system through the substation gateway to the Emergency Control Centre and channeled to the Enterprise Asset Management System.

The software should delivered with the OLM and it contains a feature for automatic update of the software.

Bidder shall submit specifications / technical details of FO cables, Coaxial cables, fiber optic cables, computers, OLM software, printer and MODEM etc. for approval during detailed engineering stage

9. Section VII. Employer's Requirements- B – Specifications, clause 15.19 which reads as follows:

**15.19. Online Condition Monitoring**

For all transformers rated 100 MVA and above, the manufacturer shall include in the offer a modern Transformer Monitoring System with the following minimum features:

DGA detection– It shall be suitable for five fault gases . The sensor shall use the principle of gas chromatography. The transformer DG unit must extract transformer oil from the transformer through suitable pump, and return the oil back into the transformer as needed. It shall have the feature of periodic self-calibration for accuracy of measurement.

Moisture in Oil sensor; bidder shall offer composite unit for dissolved gas and moisture in oil

- A remote temperature device for measurement of top-oil temperature & winding temperature.
- Load current measurement via a current transformer on HV side or LV side

OLTC monitoring unit-Tap Changer monitoring system shall be able to communicate with the central OLCM system.

The system shall be equipped with a modem and Ethernet outputs for connection to the substation communication system.

Further details are specified in the Technical Data Sheets.

has been revised as follows:

#### 15.19. Online Condition Monitoring

For all transformers rated 100 MVA and above, the manufacturer shall include in the offer a modern Transformer Monitoring System with the following minimum features:

DGA detection– It shall be suitable for five fault gases . The sensor shall use the principle of gas chromatography. The transformer DG unit must extract transformer oil from the transformer through suitable pump, and return the oil back into the transformer as needed. It shall have the feature of periodic self-calibration for accuracy of measurement.

Moisture in Oil sensor; bidder shall offer composite unit for dissolved gas and moisture in oil

- A remote temperature device for measurement of top-oil temperature & winding temperature.
- Load current measurement via a current transformer on HV side or LV side

OLTC monitoring unit-Tap Changer monitoring system shall be able to communicate with the central OLCM system through the substation gateway to the Emergency Control Centre and channeled to the Enterprise Asset Management System.

Transformer monitoring system shall be required to have a software for data visualisation and data storage at the substation level and the same should also be integrated into SCADA system.

The system shall be equipped with a modem and Ethernet outputs for connection to the substation communication system.

Further details are specified in the Technical Data Sheets.

10. Section VII - Employer's Requirements- E – Schedules of Technical Information, c) 220 kV Open Terminal Switchgear, item 7.16 which reads as follows:

c) 220 kV OPEN TERMINAL SWITCHGEAR	UNIT	DATA	
		REQUIRED	OFFERED
	String Insulators		
7.16	Insulator material	Glazed porcelain	

has been revised as follows:

c) 220 kV OPEN TERMINAL SWITCHGEAR		UNIT	DATA	
			REQUIRED	OFFERED
	String Insulators			
7.16	Insulator material		ceramic/porcelain or polymer type	

11. Section II – Bid Data Sheet, ITB 11.2(i), item 6 which reads as shown below:

ITB 11.2 (i)	<p>6. The following information shall be submitted for equipment manufacturers of major and additional equipment:</p> <ul style="list-style-type: none"> <li>a. Quality Management System Manual and ISO 9001 certification of the equipment manufacturer or other internationally recognized equivalent.</li> <li>b. ISO 45001(Occupational Health and Safety) certification of the equipment manufacturer or other internationally recognized equivalent.</li> <li>c. Catalogues, literature, and supply reference lists of proposed equipment</li> <li>d. Equipment general arrangement drawings</li> <li>e. Duly signed manufacturer's authorization.</li> </ul> <p>The major equipment are:</p> <ul style="list-style-type: none"> <li>a. Power transformer</li> <li>b. Reactor</li> <li>c. Conductors</li> <li>d. OPGW and Termination Equipment</li> <li>e. Earth wire</li> <li>f. High Voltage, Medium Voltage and Low Voltage Switchgear (Circuit Breakers, Disconnectors and Earth Switches)</li> <li>g. Instrument Transformers</li> <li>h. Surge Arrestors</li> <li>i. Control And Protection Equipment (Relays, BCUs, PMUs, MUs, SCUs, Meters, AVRs)</li> <li>j. Substation Automation System</li> <li>k. Communication System</li> <li>l. Diesel Generator</li> <li>m. Substation Auxiliary Transformer</li> <li>n. Insulators</li> </ul> <p>The additional equipment are:</p> <ul style="list-style-type: none"> <li>a. Galvanized Steel Structures (Gantries, Equipment Supports and Towers)</li> <li>b. Hardware fittings</li> <li>c. MV &amp; LV Cables</li> <li>d. Firefighting and fire alarm systems</li> <li>e. Low Voltage system</li> </ul>
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has been revised as follows:

ITB 11.2 (i)	<p>6. The following information shall be submitted for equipment manufacturers of major and additional equipment:</p> <ul style="list-style-type: none"> <li>a. Quality Management System Manual and ISO 9001 certification of the equipment manufacturer or other internationally recognized equivalent.</li> <li>b. ISO 45001(Occupational Health and Safety) certification of the equipment manufacturer or other internationally recognized equivalent.</li> <li>c. Catalogues, literature, and supply reference lists of proposed equipment</li> <li>d. Equipment general arrangement drawings</li> <li>e. Duly signed manufacturer’s authorization.</li> </ul> <p>The major equipment are:</p> <ul style="list-style-type: none"> <li>a. Power transformer</li> <li>b. Conductors</li> <li>c. OPGW and Termination Equipment</li> <li>d. Earth wire</li> <li>e. High Voltage, Medium Voltage and Low Voltage Switchgear (Circuit Breakers, Disconnectors and Earth Switches)</li> <li>f. Instrument Transformers</li> <li>g. Surge Arrestors</li> <li>h. Control And Protection Equipment (Relays, BCUs, PMUs, MUs, SCUs, Meters, AVR’s)</li> <li>i. Substation Automation System</li> <li>j. Communication System</li> <li>k. Diesel Generator</li> <li>l. Substation Auxiliary Transformer</li> <li>m. Insulators</li> </ul> <p>The additional equipment are:</p> <ul style="list-style-type: none"> <li>a. Galvanized Steel Structures (Gantries, Equipment Supports and Towers)</li> <li>b. Hardware fittings</li> <li>c. MV &amp; LV Cables</li> <li>d. Firefighting and fire alarm systems</li> <li>e. Low Voltage system</li> </ul>
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12. Section VII. Employer’s Requirements- A - Scope of Supply, clause 17 which reads as follows:

**Type Tests**

All equipment being supplied shall be fully type tested in accordance with the technical specifications and relevant standards and shall be subject to routine tests in accordance with the requirements stipulated under the respective sections.

KETRACO reserves the right to witness any and all the type tests required. Type Test



Reports shall be furnished by the Bidder along with other documents as stipulated in Section 2. Type tests should be conducted in a reputable international third party (and/or witnessed

by third party) laboratory certified in line with ISO / IEC Guide 25 / 17025 and the test reports submitted shall be of the tests conducted within last 10 (ten) years prior to the date of bid opening (unless specially agreed with the purchaser). In case the test reports are of the test conducted earlier than 10(ten) years prior to the date of bid opening, Bidders shall repeat these test(s) at no extra cost to the Employer. Accreditation certificate should be included in the Bid. Type tests should be conducted on the same type and make of the equipment, proving ratings and parameters, as required by this Contract and/or other data and information furnished by the Contractor.

In the case that type tests reports furnished with the Bid are incomplete and / or not meeting specified requirement, in the case of the Contract award, the Contractor shall arrange necessary type testing at its own cost. The Employer has the right to witness any or all of those type tests. All costs related to the witnessing of type tests shall be born

by the Contractor. Test program shall be developed by the Contractor and approved by the Employer only after all certificates (documents) on tests are submitted to the Employer.

Type tests reports shall be provided as complete set, including clearly readable copies of all documents describing tested object (data, drawings, photos) and test results (including graphs, measurement readings, calculations, conclusions, remarks if any, etc). In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design / manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all additional type tests not carried out, same shall be carried out without any additional cost implication to the Employer.

Bidders shall intimate the Employer the detailed program about the tests at least 8 (eight) weeks in advance.

Type tests shall be made on one unit of each type supplied. The Contractor shall submit valid certificates of tests made on equipment of the same type. Upon receipt of complete type tests reports, covering all type tests applicable as per specified standards and conducted by an independent, internationally recognized testing agency, and proof that the equipment and material to be tested are identical to that covered by the test certificates, the Employer will waive the requirements for corresponding type tests called for in this Specification and/or specified in the Standards.

has been revised as follows:

#### **Type Tests**

All equipment being supplied shall be fully type tested in accordance with the technical specifications and relevant standards and shall be subject to routine tests in accordance with the requirements stipulated under the respective sections.

KETRACO reserves the right to witness any and all the type tests required. Type Test

Reports shall be furnished by the Bidder along with other documents as stipulated in Section 2. Type tests should be conducted in a reputable international third party (and/or witnessed

by third party) laboratory certified in line with ISO / IEC Guide 25 / 17025 and the test reports submitted shall be of the tests conducted within last 10 (ten) years prior to the date of bid opening (unless specially agreed with the purchaser). In case the test reports are of the test conducted earlier than 10(ten) years prior to the date of bid opening, Bidders shall repeat these test(s) at no extra cost to the Employer. Accreditation certificate should be included in the Bid. Type tests should be conducted on the same type and make of the equipment, proving ratings and parameters, as required by this Contract and/or other data and information furnished by the Contractor.

In the case that type tests reports furnished with the Bid are incomplete and / or not meeting specified requirement, in the case of the Contract award, the Contractor shall arrange necessary type testing at its own cost. The Employer has the right to witness any or all of those type tests . Witnessing of these type tests will be done by 2 representatives from the Employer and one representative from the consultant. All costs related to the witnessing of type tests shall be born by the Contractor. The associated costs shall be in line with the requirements indicated in the Factory Acceptance Test subclause . The Test program shall be developed by the Contractor and approved by the Employer only after all certificates (documents) on tests are submitted to the Employer.

Type tests reports shall be provided as complete set, including clearly readable copies of all documents describing tested object (data, drawings, photos) and test results (including graphs, measurement readings, calculations, conclusions, remarks if any, etc). In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design / manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all additional type tests not carried out, same shall be carried out without any additional cost implication to the Employer.

Bidders shall intimate the Employer the detailed program about the tests at least 8 (eight) weeks in advance.

Type tests shall be made on one unit of each type supplied. The Contractor shall submit valid certificates of tests made on equipment of the same type. Upon receipt of complete type tests reports, covering all type tests applicable as per specified standards and conducted by an independent, internationally recognized testing agency, and proof that the equipment and material to be tested are identical to that covered by the test certificates, the Employer will waive the requirements for corresponding type tests called for in this Specification and/or specified in the Standards.

13. Section VII. Employer's Requirements- B – Specifications, clause 18.24.2.5 which reads as follows:

#### 18.24.2.5 HVAC Systems and Design Conditions

The HVAC system will be provided for the following purposes:

- To provide a comfortable working environment within the building for personnel and equipment.
- To warm up the incoming outside air during winter to prevent freeze-up problems.
- To maintain sufficient air circulation within the building to ensure that heat losses from the equipment do not result in an excessively uneven temperature distribution.
- To remove fumes and gases from the areas where undesirable build-up of these could otherwise occur.

The design parameters and necessary requirements to meet the design intent must be read in conjunction with other appropriate sections.

HVAC systems shall be designed, installed and commissioned in accordance with the latest applicable codes of the following:

- ASHRAE American Society of Heating, Refrigerating and Air Conditioning Project Managers.
- SMACNA Sheet Metal and Air Conditioning Contractors National Association.
- NFPA National Fire Protection Association.
- ARI American Refrigeration Institute.
- ANSI American National Standards Institute.
- AABC Associated Air Balance Council.

Calculation of heat loads and losses, cooling loads, ventilation and air flow requirements shall be made in accordance with the ASHRAE Standard for Cooling Load Calculation.

Commercially available latest version cooling load and duct system design programs (hourly analysis program (HAP)) shall be used for load calculation and the results of the calculation process shall be submitted along with a hard and a soft copy of the calculations for review and approval.

The Contractor is obliged to co-ordinate the design, installation and integration of the air-conditioning and ventilation system at the building with the related design and construction requirements of the architectural, civil, electrical and mechanical works.

All systems shall be designed and installed to provide acceptable environmental conditions for each area. The conditions of temperature, humidity, air movement and air filtration shall be controlled as required in the respective areas in summer and winter.

Main plant, equipment and distribution systems shall be provided with a 20% spare capacity allowance for future expansion.

HVAC systems serving critical areas such as Control Rooms shall be provided with duty/standby air handling and mechanical cooling plant to ensure continuity of operation.

HVAC systems shall be arranged to shut down in the event of a fire alarm, seal supply and extract ducts as required for the application of clean agent fire suppression systems, and start up smoke control pressurization systems. Provision shall be made in all plant areas for the venting and clearance of smoke and fumes in the event of fire, by means of roof vents or extract fans.

All systems and components shall be suitable for the design life of the Plant, and be designed for minimum life cycle cost and complexity, consistent with functionality, ease of maintenance and reliability.

For all general cases the HVAC system's ambient design conditions shall be as ASHRAE recommendations to suite the site conditions.

The HVAC systems shall be designed to obtain the internal conditions and system redundancy as indicated in the table below.

Area (s)	Internal Condition	Comment
Control rooms Offices Electronic rooms Laboratories Relay rooms	Summer: 25°C db ± 1.5°C 50% r.h ± 5% Winter: 22°C db ± 1.5°C 40% r.h minimum.	Central air conditioning systems with 2 x 100% air handling units and standby mechanical cooling.
Workshop/stores Lecture rooms Prayer rooms.	Summer:- 25°C db ± 1.5°C 50% r.h ± 5% Winter: 22°C db ± 1.5°C No humidity control.	Central air conditioning systems 2 x 50% air handling units. No standby mechanical cooling.
Corridors. Stairs.	28°C db max. 20°C db min.	Pressurization systems for smoke control may be required in these areas.

Area (s)	Internal Condition	Comment
Toilets	28°C db max. 18°C db min.	Extract ventilation (10 AC/h min.) Rooms under negative pressure.
Mess rooms.	25°C db max. 18°C db min.	Extract ventilation (6 AC/h min.) Rooms under negative pressure.
Excitation Switchgear Rectifier/inverter	42°C db max. 25°C db min 40°C db max No humidity control	AC systems with 100% fresh air facility for free cooling. 2 x 50% air handling units. Contractor to ensure Maximum and minimum temperatures (as specified by the equipment manufacturers) are not exceeded under maximum site conditions
Battery rooms	27°C db max. 22°C db min.	100% exhaust with duty/standby fans. Max 1% hydrogen concentration. Rooms under negative pressure. Contractor to ensure Maximum and minimum temperatures (as specified by the equipment manufacturers) are not exceeded under maximum site conditions
Standby diesel generator room	5°C above ambient db max. No winter heating.	Supply/extract ventilation for "normal" operation (DG off) plus boost ventilation (DG running) to DG. Contractor to ensure Maximum and minimum

Area (s)	Internal Condition	Comment
		temperatures (as specified by the equipment manufacturers) are not exceeded under maximum site conditions

All HVAC units and systems shall be provided with local control panels for local manual/automatic control. The operation status such as alarms, humidity, temperature, fault indication, status indication of each air conditioning system shall be indicated and available at the local control panel and any individual fault signal results in a group signal, which shall be transmitted to the central control room.

In addition, the following criteria shall be considered in the design of the HVAC system:

- i. A general lighting level dissipation of 20 watts/m<sup>2</sup>
- ii. Sensible and latent heat gains for occupancy should be allowed on the basis of one person per 10m<sup>2</sup>.
- iii. A minimum quantity of fresh air should be provided at the rate of 0.00125m<sup>3</sup>/s per m<sup>2</sup> of floor area or 12 l/s/person, whichever is the greater and this should be shown in the calculations. Actual equipment gains within each room should be allowed for in determining Plant capacities. Determination of these values should be identified within the calculations.
- iv. Re-circulated air should be filtered. Air from areas where pungent fumes are likely to be present should not be re-circulated.

Battery rooms should be air conditioned by self-contained air conditioning units, where appropriate, or alternatively a centralized air conditioning system. The design of the air conditioning system shall avoid recirculation of air back into the battery room. These units should be of the non-recirculation type and sized to provide the internal conditions previously specified with a minimum of five air changes per hour. Duplicate extract fans should be provided, mounted at high level and positioned such that accumulations of hydrogen cannot occur. The fan units should be suitable for long life in the acidic environment

has been revised as follows:

#### 18.24.2.5 HVAC Systems and Design Conditions

The HVAC system will be provided for the following purposes:

- To provide a comfortable working environment within the building for personnel and equipment.
- To warm up the incoming outside air during winter to prevent freeze-up problems.

- To maintain sufficient air circulation within the building to ensure that heat losses from the equipment do not result in an excessively uneven temperature distribution.
- To remove fumes and gases from the areas where undesirable build-up of these could otherwise occur.

The design parameters and necessary requirements to meet the design intent must be read in conjunction with other appropriate sections.

HVAC systems shall be designed, installed and commissioned in accordance with the latest applicable codes of the following:

- ASHRAE American Society of Heating, Refrigerating and Air Conditioning Project Managers.
- SMACNA Sheet Metal and Air Conditioning Contractors National Association.
- NFPA National Fire Protection Association.
- ARI American Refrigeration Institute.
- ANSI American National Standards Institute.
- AABC Associated Air Balance Council.

Calculation of heat loads and losses, cooling loads, ventilation and air flow requirements shall be made in accordance with the ASHRAE Standard for Cooling Load Calculation.

Commercially available latest version cooling load and duct system design programs (hourly analysis program (HAP)) shall be used for load calculation and the results of the calculation process shall be submitted along with a hard and a soft copy of the calculations for review and approval.

The Contractor is obliged to co-ordinate the design, installation and integration of the air-conditioning and ventilation system at the building with the related design and construction requirements of the architectural, civil, electrical and mechanical works.

All systems shall be designed and installed to provide acceptable environmental conditions for each area. The conditions of temperature, humidity, air movement and air filtration shall be controlled as required in the respective areas in summer and winter.

Main plant, equipment and distribution systems shall be provided with a 20% spare capacity allowance for future expansion.

HVAC systems serving critical areas such as Control Rooms shall be provided with duty/standby air handling and mechanical cooling plant to ensure continuity of operation.

HVAC systems shall be arranged to shut down in the event of a fire alarm, seal supply and extract ducts as required for the application of clean agent fire suppression systems, and start up smoke control pressurization systems. Provision shall be made in all plant areas for the venting and clearance of smoke and fumes in the event of fire, by means of roof vents or extract fans.



All systems and components shall be suitable for the design life of the Plant, and be designed for minimum life cycle cost and complexity, consistent with functionality, ease of maintenance and reliability.

For all general cases the HVAC system's ambient design conditions shall be as ASHRAE recommendations to suite the site conditions.

The HVAC systems shall be designed to obtain the internal conditions and system redundancy as indicated in the table below.

Area (s)	Internal Condition	Comment
Control rooms Offices Electronic rooms Laboratories Relay rooms	Summer: 25°C db $\pm$ 1.5°C 50% r.h $\pm$ 5% Winter: 22°C db $\pm$ 1.5°C 40% r.h minimum.	Split Unit Air conditioning systems
Workshop/stores Lecture rooms Prayer rooms.	Summer:- 25°C db $\pm$ 1.5°C 50% r.h $\pm$ 5% Winter: 22°C db $\pm$ 1.5°C No humidity control.	Split Unit Air conditioning systems
Corridors. Stairs.	28°C db max. 20°C db min.	Pressurization systems for smoke control may be required in these areas.
Toilets	28°C db max. 18°C db min.	Extract ventilation (10 AC/h min.) Rooms under negative pressure.
Mess rooms.	25°C db max. 18°C db min.	Extract ventilation (6 AC/h min.) Rooms under negative pressure.
Excitation Switchgear Rectifier/inverter	42°C db max. 25°C db min 40°C db max No humidity control	Split Unit Air conditioning systems under maximum site conditions
Battery rooms	27°C db max. 22°C db min.	100% exhaust with duty/standby fans. Max 1% hydrogen concentration. Rooms under negative pressure. Contractor to ensure Maximum and minimum temperatures (as specified by the equipment manufacturers) are not exceeded under maximum site conditions

Area (s)	Internal Condition	Comment
Standby diesel generator room	5°C above ambient db max. No winter heating.	Supply/extract ventilation for "normal" operation (DG off) plus boost ventilation (DG running) to DG. Contractor to ensure Maximum and minimum temperatures (as specified by the equipment manufacturers) are not exceeded under maximum site conditions

All HVAC units and systems shall be provided with local control panels for local manual/automatic control. The operation status such as alarms, humidity, temperature, fault indication, status indication of each air conditioning system shall be indicated and available at the local control panel and any individual fault signal results in a group signal, which shall be transmitted to the central control room.

In addition, the following criteria shall be considered in the design of the HVAC system:

- i. A general lighting level dissipation of 20 watts/m<sup>2</sup>
- ii. Sensible and latent heat gains for occupancy should be allowed on the basis of one person per 10m<sup>2</sup>.
- iii. A minimum quantity of fresh air should be provided at the rate of 0.00125m<sup>3</sup>/s per m<sup>2</sup> of floor area or 12 l/s/person, whichever is the greater and this should be shown in the calculations. Actual equipment gains within each room should be allowed for in determining Plant capacities. Determination of these values should be identified within the calculations.
- iv. Re-circulated air should be filtered. Air from areas where pungent fumes are likely to be present should not be re-circulated.

Battery rooms should be air conditioned by fans. The design of the air conditioning system shall avoid recirculation of air back into the battery room. These units should be of the non-recirculation type and sized to provide the internal conditions previously specified with a minimum of five air changes per hour. Duplicate extract fans should be provided, mounted at high level and positioned such that accumulations of hydrogen cannot occur. The fan units should be suitable for long life in the acidic environment

14. Section VII. Employer's Requirements- B – Specifications Clause 18.24.2.5 which reads as follows:

**12.7.1. Construction**

Energy meters shall be numerical and of the 3-phase 4-wire measuring principle and conform to IEC62053-22 accuracy class 0.2s for active meters and IEC62053-23 accuracy class 2.0 for reactive meters.

All meter functions shall be accessible from the front. The front cover shall provide a clear window for reading the display and all removable covers shall be sealable to prevent unauthorised access.

The meter shall be rear mount construction and have a degree of protection of IP51 (IEC60529).

The meter shall be powered from an auxiliary AC (via UPS) or DC. Upon normal supply failure meters shall be powered from auxiliary VT supplies.

The meter terminals shall be brass or nickel plated brass and accommodate cable cores of at least 6mm<sup>2</sup>.

The meter shall have self-monitoring capability and raise a remote alarm via the substation control system (SCS) when faulty.

**has been revised as follows:**

**12.7.1. Construction**

Energy meters shall be numerical and of the 3-phase 4-wire measuring principle and conform to IEC62053-22 accuracy class 0.2s for active meters and IEC62053-23 accuracy class 0.2s for reactive meters.

All meter functions shall be accessible from the front. The front cover shall provide a clear window for reading the display and all removable covers shall be sealable to prevent unauthorised access.

The meter shall be rear mount construction and have a degree of protection of IP51 (IEC60529).

The meter shall be powered from an auxiliary AC (via UPS) or DC. Upon normal supply failure meters shall be powered from auxiliary VT supplies.

The meter terminals shall be brass or nickel plated brass and accommodate cable cores of at least 6mm<sup>2</sup>.

The meter shall have self-monitoring capability and raise a remote alarm via the substation control system (SCS) when faulty

15. Section III – Evaluation and Qualification Criteria, item 2 - Evaluation of Financial Part, part c, Functional Guarantees of the Facilities which reads as follows:

**1. During evaluation, transformer losses will be capitalized as follows:**

The cost of guaranteed power transformer no-load and load losses will be added to the cost of the transformer, and the evaluated cost of the transformer shall be calculated as per the following formula:

$$C_{Tev} = C_T + (L_n \times C_{Ln}) + (L_L \times C_{LL})$$

Where:

- $C_{Tev}$  = The evaluated cost of the transformer;
- $C_T$  = The cost of the transformer as indicated in the Schedule of Rates and Prices;

- $L_n$  = The no-load losses in kW, as indicated in the Schedule of Technical Information;
- $L_L$  = The load losses in kW (the sum of the transformer copper loss plus auxiliary loss at rated power and principal tapping) as indicated in the Schedule of Technical Information;
- $C_{Ln}$  = The cost per kW of no-load losses, that is 12,000 USD/kW;
- $C_{LL}$  = The cost per kW of load losses, that is 7,000 USD/kW.

The evaluation shall be based on the losses indicated by the Bidder in the Guaranteed Technical Particulars/Schedule of Technical Information. Values of 0.5 kW and above will be rounded up to the next full kW.

The evaluated cost of the transformer shall be multiplied by the total number of transformers to arrive at the total evaluated cost.

The total capitalized cost of the losses will be added to the cost of transformers for comparing bids.

Any adjustment in cost that results from the procedure above shall be added to the bid price for the purpose of comparative evaluation only, to arrive at an "evaluated bid price". Bid prices quoted by Bidders shall remain unaltered.

has been revised as follows:

**1. During evaluation, transformer losses will be capitalized as follows:**

The cost of guaranteed power transformer no-load and load losses will be added to the cost of the transformer, and the evaluated cost of the transformer shall be calculated as per the following formula:

$$C_{Tev} = C_T + (L_n \times C_{Ln}) + (L_L \times C_{LL})$$

Where:

- $C_{Tev}$  = The evaluated cost of the transformer;
- $C_T$  = The cost of the transformer as indicated in the Schedule of Rates and Prices;
- $L_n$  = The no-load losses in kW, as indicated in the Schedule of Technical Information;
- $L_L$  = The load losses in kW (the sum of the transformer copper loss plus auxiliary loss at rated power and principal tapping) as indicated in the Schedule of Technical Information;
- $C_{Ln}$  = The cost per kW of no-load losses, that is 12,000 USD/kW;
- $C_{LL}$  = The cost per kW of load losses, that is 7,000 USD/kW.

The evaluation shall be based on the losses indicated by the Bidder in the Guaranteed Technical Particulars/Schedule of Technical Information. Values of 0.5 kW and above will be rounded up to the next full kW.

In the case where a Bidder has proposed several manufacturers who have qualified, the highest losses among the manufacturers will be used.

The evaluated cost of the transformer shall be multiplied by the total number of transformers to arrive at the total evaluated cost.

The total capitalized cost of the losses will be added to the cost of transformers for comparing bids.

Any adjustment in cost that results from the procedure above shall be added to the bid price for the purpose of comparative evaluation only, to arrive at an "evaluated bid price". Bid prices quoted by Bidders shall remain unaltered.

16. Section VII. Employer's Requirements- A - Scope of Supply, clause 20, subclause v which reads as follows:

**v. Software**

The contractor shall provide software, server based licenses (where available) and subscriptions for the Employer. The contractor shall provide six user licenses for a period of six years. This software shall be as indicated in the Scope of supply document. The following, in addition to other software used by the contractor in the project design, shall be provided in the latest version:

AutoCAD for windows

STAAD Pro

DlgSILENT

DIALux

BIM software

**has been revised as follows:**

**v. Software**

The contractor shall provide softwares with server based licenses (where available) and subscriptions for the Employer. The contractor shall provide six user licenses for a period of six years. The following softwares ( latest versions) with the indicated requirements shall be provided

- a. AutoCAD for windows
- b. STAAD Pro
- c. DlgSILENT with the following module:
  1. Contingency Analysis
  2. Quasi Dynamic Simulation
  3. Network Reduction
  4. Time Overcurrent Protection
  5. Distance Protection
  6. Power quality and Harmonic Analysis
  7. Transmission Network Tools

- 8. Outage Planning
  - 9. Techno Economical Analysis
  - 10. Stability Analysis Function ( RMS)
  - 11. Electromagnetic Transients( EMT)
  - 12. Small Signal Stability ( Eigenvalue Analysis)
  - 13. Scripting and Automation
  - d. DIALux
  - e. BIM software
17. Section VII. Employer's Requirements- B – Specifications, clause 22.3.3.6, item (e) which reads as follows:
- e) Min. arcing distance with corona rings: 4070 mm
  - f) Min. Creepage distance: 16000mm

**has been revised as follows:**

- e) Min. arcing distance with corona rings: 3745 m
- f) Min. Creepage distance: 13020 mm

18. Section VII. Employer's Requirements- B – Specifications, clause 3.3.1 which reads as follows:

#### **3.3.1. Disconnectors**

The disconnectors shall be constructed and fully type tested in accordance with the requirements of IEC 62271-102 and this Specification. The design shall incorporate features which shall reduce or eliminate very high frequency voltage transients during disconnector operation.

It is preferred that disconnector contacts can be maintained and replaced with the associated earthing switch closed.

The disconnectors shall be provided with power and manually operated mechanisms. The power operation of the disconnectors shall be capable of being controlled from a local or remote point.

Each power-operated disconnector shall be complete with a lockable LOCAL/REMOTE selector switch and OPEN/NEUTRAL/CLOSE control switch or push buttons. The function of all control and selector switches shall be clearly labelled. Power operating mechanisms shall be capable of being locked in the open or closed positions; they shall also be suitable for the operation from voltage specified in the Schedules of this Specification.

Manual operation of the disconnectors for maintenance purposes shall be provided. The number of normally open (NO) and normally closed (NC) auxiliary switches required shall be as dictated by the particular scheme of application plus 30% extra as spare. Where any particular scheme requires special timing of auxiliary contacts, these shall be provided. The design of the NO and NC auxiliary contacts shall allow for equipment intermediate position i.e. a state in which both NO and NC contacts do not make.

The number of the NO and NC contacts shall be as per the schedules of technical information

The auxiliary contacts shall comprise of NO, NC as well as MBB (Make before break) type auxiliary Contacts

Electrical control circuits shall be so arranged that once initiated, an operation shall be completed unless prevented by loss of supply or operation of the motor protection. On restoration of supply the operation shall be completed. Emergency hand operation shall be provided on power-operated disconnectors and the power drive shall be mechanically disconnected during hand operation. It is required that the manual effort to operate the disconnectors or earth switches shall be less than 150N. There shall be adequate access for the manual operation.

In the case where the operating mechanism comprises an energy storage system followed by triggering for completion of the operation, the design shall exclude any possibility of operation by accidental triggering. Switch operation shall be effective only after full charging of the operating mechanism and after deliberate operator action.

Operating motors shall be provided with thermal overload protection and in the case of 3 phase motors, phase unbalanced protection.

All operational interlocks shall function through the electrical bolt interlock circuit. Electrical bolt interference interlocks shall be provided and energised, in the case of hand operation, only when the operating handle of the hand mechanism is brought into the working position or in the case of power operation, when the motor is called upon to operate. A means of overriding the electrical interlock, in the event of loss of auxiliary supplies, shall be provided; the override shall be lockable.

The operating handles for manual operation of power-operated mechanisms may be detachable, in which case only two handles of each type are required per substation. The disconnector switch control circuit shall be designed such that in the event of loss of motor supply (MCB trip at equipment control cubicle, yard marshalling kiosk or DC distribution board) the Control circuit shall not be complete i.e. the open and/or close contactors not to be actuated in the event of loss of motor supply.

**has been revised as follows:**

#### **3.3.1. Disconnectors**

The disconnectors shall be constructed and fully type tested in accordance with the requirements of IEC 62271-102 and this Specification. The design shall incorporate features which shall reduce or eliminate very high frequency voltage transients during disconnector operation.

It is preferred that disconnector contacts can be maintained and replaced with the associated earthing switch closed.

The disconnectors shall be provided with power and manually operated mechanisms. The power operation of the disconnectors shall be capable of being controlled from a local or remote point.

Each power-operated disconnector shall be complete with a lockable LOCAL/REMOTE selector switch and OPEN/NEUTRAL/CLOSE control switch or push buttons. The function of all control and selector switches shall be clearly labelled.



Power operating mechanisms shall be capable of being locked in the open or closed positions; they shall also be suitable for the operation from voltage specified in the Schedules of this Specification.

Manual operation of the disconnectors for maintenance purposes shall be provided. The number of normally open (NO) and normally closed (NC) auxiliary switches required shall be as dictated by the particular scheme of application plus 30% extra as spare. Where any particular scheme requires special timing of auxiliary contacts, these shall be provided. The design of the NO and NC auxiliary contacts shall allow for equipment intermediate position i.e. a state in which both NO and NC contacts do not make.

The number of the NO and NC contacts shall be as per the schedules of technical information

The auxiliary contacts shall comprise of NO, NC as well as MBB (Make before break) type auxiliary Contacts

Electrical control circuits shall be so arranged that once initiated, an operation shall be completed unless prevented by loss of supply or operation of the motor protection. On restoration of supply the operation shall be completed. Emergency hand operation shall be provided on power-operated disconnectors and the power drive shall be mechanically disconnected during hand operation. It is required that the manual effort to operate the disconnectors or earth switches shall be less than 150N. There shall be adequate access for the manual operation.

In the case where the operating mechanism comprises an energy storage system followed by triggering for completion of the operation, the design shall exclude any possibility of operation by accidental triggering. Switch operation shall be effective only after full charging of the operating mechanism and after deliberate operator action.

Operating motors shall be provided with thermal overload protection and in the case of 3 phase motors, phase unbalanced protection.

All operational interlocks shall function through the electrical bolt interlock circuit.

Electrical bolt interference interlocks shall be provided and energised, in the case of hand operation, only when the operating handle of the hand mechanism is brought into the working position or in the case of power operation, when the motor is called upon to operate. A means of overriding the electrical interlock, in the event of loss of auxiliary supplies, shall be provided; the override shall be lockable.

The operating handles for manual operation of power-operated mechanisms may be detachable, in which case only two handles of each type are required per substation.

The disconnector switch control circuit shall be designed such that in the event of loss of motor supply (MCB trip at equipment control cubicle, yard marshalling kiosk or DC distribution board) the Control circuit shall not be complete i.e. the open and/or close contactors not to be actuated in the event of loss of motor supply.

Operating mechanism and box of the disconnector shall be separate from the one for the earth switch.

19. Section VII - Employer's Requirements- E – Schedules of Technical Information, c) 220 kV Open Terminal Switchgear, item 4.33.6 which reads as follows:

c) 220 kV Open Terminal Switchgear		UNIT	DATA	
			REQUIRED	OFFERED
	220 kV Current Transformers			
4.33.6	Rated output (burden to be 25-100% rated burden)	VA	50	

**has been revised as follows:**

c) 220 kV Open Terminal Switchgear		UNIT	DATA	
			REQUIRED	OFFERED
	220 kV Current Transformers			
4.33.6	Rated output (burden to be 25-100% rated burden)	VA	Acc. to PSD	

20. Drawing titled 26.Kimuka-400-220kV-SS-Guard-House-&Telecom-Collocation-Room-Arch dwg **has been revised as attached in Attachment 12.**

21. Section VII - Employer's Requirements - A – Scope of supply –clause 1.2.1. Works at New Kimuka 400/220 kV Substation, bullet (m), which reads as shown below:

Septic tanks shall be considered for waste drainage.

**has been revised as follows:**

Septic tanks shall be considered for waste drainage. The septic tank design shall be based on a minimum occupancy of 46 people distributed as follows:

- a. Control building: 10
- b. Warehouse: 2
- c. Guard House: 2
- d. Technical staff housing: 24
- e. Security staff housing: 8

The final number and capacity of the septic tanks shall be determined during the detailed design stage in line with site conditions and applicable standards. This shall also be subject to the approval of the Employer/Employer's representative.

22. Drawing titled 14-7.Kimuka-400-220kV-GENERAL LAYOUT (SCOPE OF WORK) has been **revised as attached in Attachment 13.**

23. Section VII - Employer's Requirements - B – Specifications, clause 22.6.2. –Material which reads as shown below:

All rolled steel sections, flats, plates and bolt and nut bars used shall consist of steel manufactured by an approved process and shall be to the requirements of BS EN 10025 for grades S235JR and S355JO steel or equivalent from other approved

standards, the provisions of which in respect of tests and analyses shall be extended to include steel less than 6 mm thick. The steel shall be free from blisters, scales, laminations or other defects. Steel sections shall preferably be ISO Standard sections chosen with a view to avoiding delays in obtaining material.

High tensile steel when stored in the fabricator's stock-yard prior to fabrication and galvanising shall be marked continuously throughout its length with a light blue water paint line. In addition the grade of steel shall be painted on and ringed round with paint.

**has been revised as follows:**

All rolled steel sections, flats, plates and bolt and nut bars used shall consist of steel manufactured by an approved process and shall be to the requirements of BS EN 10025 for grades S275JR and S355JO steel or equivalent from other approved standards, the provisions of which in respect of tests and analyses shall be extended to include steel less than 6 mm thick. The steel shall be free from blisters, scales, laminations or other defects. Steel sections shall preferably be ISO Standard sections chosen with a view to avoiding delays in obtaining material.

High tensile steel when stored in the fabricator's stock-yard prior to fabrication and galvanising shall be marked continuously throughout its length with a light blue water paint line. In addition the grade of steel shall be painted on and ringed round with paint.

**24. Section VII. Employer's Requirements- B – Specifications, clause 25.1 which reads as follows:**

**25.1 Introduction**

This Specification covers the ratings, design, equipment requirements, erection, inspection and testing of complete earthing system and lightning protection system. Earthing system shall mean a complete copper conductor ground grid system, which includes all conductors, earthing rods, connectors, equipotential mats, equipment and other measures required to complete earthing of switchyards, indoor switchgears and buildings

This is basically a performance specification and covers only those aspects that are required to define a minimum standard of quality and performance. Other details and specific data are contained in the Contract drawings, Technical Schedules and other documents that form part of the Tender Documents.

The Contractor is deemed to have visited the site and the area where the substation is to be located prior to submitting his Tender, making observations in order that he can assess the quantities required for earth electrodes to satisfy the specification requirements.

All materials and equipment shall be provided as required to make a complete, properly, functioning installation and shall conform to the highest standards of engineering design and workmanship.

The Contractor shall at an early stage of the Project and before the Site works commence undertake a survey of the ground all over the site in order to establish general characteristics and ascertain values of soil resistivity at various depths to a minimum of 20 m and measure the aggressiveness of soil. If a plot will be filled with

a soil layer > 1 m to rise the level, two soil resistivity measurements – one before and one after the filling – shall be carried out. A report of the resistivity values measured, the effective earth resistivity, the expected resistance of the proposed grid and aggressiveness of soil shall be submitted to KETRACO/Engineer for approval. Based on the above survey the Contractor shall prepare a detail design of the earthing system and lightning protection system for approval by Ketraco/Engineer. Thereafter the Contractor shall supply, excavate, install, erect, backfill and test the installation to the satisfaction of KETRACO /Engineer. Calculations and designs shall be made using a latest version of earthing calculation and design software. Prior to any Earthing System calculation, the Contractor shall agree with KETRACO /Engineer what type of computer programme shall be applied for the Earthing System calculation. On completion of the work the complete datasets and outputs including drawings and designs from the software shall be provided to Ketraco for future use.

has been revised as follows:

#### **25.1 Introduction**

This Specification covers the ratings, design, equipment requirements, erection, inspection and testing of complete earthing system and lightning protection system. Earthing system shall mean a complete copper conductor ground grid system, which includes all conductors, earthing rods, connectors, equipotential mats, equipment and other measures required to complete earthing of switchyards( including present and future bays), indoor switchgears and buildings

This is basically a performance specification and covers only those aspects that are required to define a minimum standard of quality and performance. Other details and specific data are contained in the Contract drawings, Technical Schedules and other documents that form part of the Tender Documents.

The Contractor is deemed to have visited the site and the area where the substation is to be located prior to submitting his Tender, making observations in order that he can assess the quantities required for earth electrodes to satisfy the specification requirements.

All materials and equipment shall be provided as required to make a complete, properly, functioning installation and shall conform to the highest standards of engineering design and workmanship.

The Contractor shall at an early stage of the Project and before the Site works commence undertake a survey of the ground all over the site in order to establish general characteristics and ascertain values of soil resistivity at various depths to a minimum of 20 m and measure the aggressiveness of soil. If a plot will be filled with a soil layer > 1 m to rise the level, two soil resistivity measurements – one before and one after the filling – shall be carried out. A report of the resistivity values measured, the effective earth resistivity, the expected resistance of the proposed grid and aggressiveness of soil shall be submitted to KETRACO/Engineer for approval. Based on the above survey the Contractor shall prepare a detail design of the earthing system and lightning protection system for approval by Ketraco/Engineer.



Thereafter the Contractor shall supply, excavate, install, erect, backfill and test the installation to the satisfaction of KETRACO /Engineer.

Calculations and designs shall be made using a latest version of earthing calculation and design software. Prior to any Earthing System calculation, the Contractor shall agree with KETRACO /Engineer what type of computer programme shall be applied for the Earthing System calculation. On completion of the work the complete datasets and outputs including drawings and designs from the software shall be provided to Ketraco for future use.

25. Section VII. Employer's Requirements- B – Specifications, clause 22.4.10, paragraph 5, page 419 of 488 which reads as follows:

**22.4.10 Construction of tower steelwork**

All steel members and bolts and nuts shall be hot dip galvanized. Galvanize shall be 600g/m<sup>2</sup> (85µm) average and 500g/m<sup>2</sup> (70µm) minimum for members and 376g/m<sup>2</sup> (53µm) average and 305g/m<sup>2</sup> (43µm) minimum for bolts and nuts.

**has been revised as follows:**

**22.4.10 Construction of tower steelwork**

All steel members and bolts and nuts shall be hot dip galvanized. The galvanization shall be zinc coating of not less than 610 gm per square metre of zinc on surface of all steel members, bolts and nuts. Threaded sections shall have a minimum zinc coating weight of 305 gm per square metre.

26. Section VII-Employer's Requirements- B – Specifications-clause 22.4.5- Tower types (4th paragraph page 412 of 488) that reads as shown below:

Towers shall be provided with body extensions of +3m, +6m, +9m and +12m and each type designation will carry the construction type (ie.400S+3m etc.).

**has been revised as follows:**

Towers shall be provided with body extensions of -3m, +3m, +6m, +9m and +12m and each type designation will carry the construction type (ie.400S+3m etc.).

27. Section VII-Employer's Requirements- B – Specifications-clause 18.2- General scope (8th bullet page 282 of 488) that reads as shown below:

External access road from main road to substation by a standard junction shall be implemented to all-weather murram standard and according to Kenya roads regulations. Necessary warnings / signage shall also be fixed. Suitable slopes / drains / manholes shall be provided for water to flow to the drainage system. The road shall have adequate lighting which is automatically controlled based on the ambient light intensity.

**has been revised as follows:**

External access road from main road to substation by a standard junction shall be implemented to bituminous standards and according to Kenya roads regulations. Necessary warnings / signage shall also be fixed. Suitable slopes / drains / manholes shall be provided for water to flow to the drainage system.

28. Section VII - Employer's Requirements- B – Specifications Clause 11.3.3.1 - General Design Requirements which reads as shown below:

**11.3.3.1. General Design Requirements**

The 110V DC service equipment shall be designed, supplied and installed to provide high availability, reliable and safe supply for control, protection, alarm and indication devices, tripping and closing circuits, emergency power and emergency lighting.

The 110 V battery system shall comprise 2 x 1000% rated duty (Ni-Cd) type battery units and 2 x 100% rated duty float/boost charger units. These shall be arranged such that under normal conditions both float chargers are operating to supply the specified DC load via two busbars operated independently and at the same time each automatically float charging its associated battery to keep it fully charged within the specified voltage limit for the correct operation of equipment.

It shall be possible to switch either charger out of service leaving the remaining charger and batteries to carry the full DC load requirement and at the same time provide the full battery float charge requirements. It shall not be possible to switch off more than one charger at one time.

It shall also be possible to switch either battery out of service leaving the remaining chargers and batteries to carry the full DC load requirement and at the same time provide the full battery float charge requirements. In this case the normally independent DC supply busbars shall be coupled through a bus section switch.

The system shall be such that either battery may be connected to the chargers through changeover contactors, which shall be mounted in the DC Switchboard.

Under boost charge conditions the charger shall be capable of supplying the full boost charge requirement, taking care not to exceed the maximum permissible battery voltage. Only one battery unit (100% of total battery capacity) shall be on boost charge at any one time and means shall be provided to automatically limit the voltage applied to the loads connected to the DC bus during the boost charge period to a value no greater than the float charge value.

In case of loss of AC supply during boost charging, the charger shall return automatically to the float charge position upon restoration of AC supply and the battery automatically reconnect to the DC busbar. The charger shall continue to operate in float charge mode unless manually re-selected to boost charge.

The second 100% charger shall continue to operate normally in float charge mode with the second battery and continue to supply its own DC load requirement.

Selection of the boost charge shall be by manual means. Each charger shall be rated to be capable of boost recharging each battery from the discharge condition to 100% of fully charged capacity in a time not exceeding 8 hours. The control of the boost

charge condition shall be such that the charging rate is reduced as the battery approaches full charge to avoid excessive gassing.

When selected to "Boost charge" mode, the battery condition shall be monitored and on achieving a fully charged condition, the rectifier shall automatically regulate the charging current and change over to the float charge mode. The maximum period of boost charging shall be controlled automatically by a preset timing switch which will return the charger to float mode.

The 110-volt battery system shall be centre point earthed through a limiting resistance to limit earth fault D.C. current to maximum 10 mA. A suitable D.C. centre zero milli-ammeter shall be provided for the detection and clearing of 110 volts D.C. faults. A suitable battery earth fault scheme shall be provided, which shall be capable of detecting, in the event of an earth fault, whether the positive or negative pole is earthed. Earth-fault alarm shall be initiated locally and remotely via the SCS.

**has been revised as follows:**

#### **11.3.3.1. General Design Requirements**

The 110V DC service equipment shall be designed, supplied and installed to provide high availability, reliable and safe supply for control, protection, alarm and indication devices, tripping and closing circuits, emergency power and emergency lighting.

The 110 V battery system shall comprise 2 x 100% rated duty Nickel-Cadmium (Ni-Cd) type battery units and 2 x 100% rated duty float/boost charger units. These shall be arranged such that under normal conditions both float chargers are operating to supply the specified DC load via two busbars operated independently and at the same time each automatically float charging its associated battery to keep it fully charged within the specified voltage limit for the correct operation of equipment.

It shall be possible to switch either charger out of service leaving the remaining charger and batteries to carry the full DC load requirement and at the same time provide the full battery float charge requirements. It shall not be possible to switch off more than one charger at one time.

It shall also be possible to switch either battery out of service leaving the remaining chargers and batteries to carry the full DC load requirement and at the same time provide the full battery float charge requirements. In this case the normally independent DC supply busbars shall be coupled through a bus section switch.

The system shall be such that either battery may be connected to the chargers through changeover contactors, which shall be mounted in the DC Switchboard.

Under boost charge conditions the charger shall be capable of supplying the full boost charge requirement, taking care not to exceed the maximum permissible battery voltage. Only one battery unit (100% of total battery capacity) shall be on boost charge at any one time and means shall be provided to automatically limit the voltage applied to the loads connected to the DC bus during the boost charge period to a value of 121 V.



In case of loss of AC supply during boost charging, the charger shall return automatically to the float charge position upon restoration of AC supply and the battery automatically reconnect to the DC busbar. The charger shall continue to operate in float charge mode unless manually re-selected to boost charge.

The second 100% charger shall continue to operate normally in float charge mode with the second battery and continue to supply its own DC load requirement.

Selection of the boost charge shall be by automatic means. Each charger shall be rated to be capable of boost recharging each battery from the discharge condition to 100% of fully charged capacity in a time not exceeding 8 hours. The control of the boost charge condition shall be such that the charging rate is reduced as the battery approaches full charge to avoid excessive gassing.

When selected to "Boost charge" mode, the battery condition shall be monitored and on achieving a fully charged condition, the rectifier shall automatically regulate the charging current and change over to the float charge mode. The maximum period of boost charging shall be controlled automatically by a preset timing switch which will return the charger to float mode.

The 110-volt battery system shall be centre point earthed through a limiting resistance to limit earth fault D.C. current to maximum 10 mA. A suitable D.C. centre zero milli-ammeter shall be provided for the detection and clearing of 110 volts D.C. faults. A suitable battery earth fault scheme shall be provided, which shall be capable of detecting, in the event of an earth fault, whether the positive or negative pole is earthed. Earth-fault alarm shall be initiated locally and remotely via the SCS.

29. Form of Security-Bid Bond has been included. Refer to Attachment 1.
30. A drawing illustrating the coordinates of the access road into Kimuka Substation has been included. Refer to Attachment 2.
31. A drawing of the internal access roads has been included. Refer to Attachment 3.
32. Angle point coordinates for the LILO have been included. Refer to Attachment 4.
33. Drawing titled 14-5.Kimuka-400-220kV-Layout-SITE PLAN has been revised as attached in Attachment 5.
34. Price Schedules have been revised as attached in Attachment 6.
35. The electrical clearance diagram for tower type 400S has been provided as attachment 7.
36. Section VII-Employer's Requirements- B – Specifications-clause 18.5- Control Building (5th bullet page 283 of 488) that reads as shown below:

With sandwich panel gable roof and galvanized steel gutter and gutter strap. The rooms contained panels, shall have available usable height of 3.5 meters as minimum (to have 1.2 m clearance over the top of the tallest cabinets/panels to the bottom of ceiling, as minimum)

**has been revised as follows:**

False roof over the reinforced concrete roof slab utilizing IT5 galvanized sheets supported on steel trusses, with galvanized steel gutter and gutter strap. The rooms contained panels, shall have available usable height of 3.5 meters as minimum (to have 1.2 m clearance over the top of the tallest cabinets/panels to the bottom of ceiling, as minimum).

37. Drawing titled 31.Kimuka-400-220kV-SS-Security-Staff-Housing-Architectural has been revised as attached in Attachment 8.
38. Drawing titled 25.Kimuka-400-220kV-SS-Bay-Control-Room-Architectural has been revised as attached in Attachment 9.
39. Drawing titled 30.Kimuka-400-220kV-SS-Technical-Staff-Housing-Architectural has been revised as attached in Attachment 10.
40. Drawing titled 13.Kimuka-400-220kV-SS-Control-Building-Architectural has been revised as attached in Attachment 11.
41. Section III – Bid Data Sheet – ITB 11.2(i) item 5 which reads as shown below:

ITB 11.2 (i)	<p>5. Copies of Type Test Reports and technical documents (catalogues, brochures, drawings) of each major equipment offered shall form part of the bid. Copies of Type Test Reports shall meet the following requirements:</p> <ol style="list-style-type: none"> <li>a. All equipment being supplied shall conform to Type Tests as per Technical Specifications. Type test reports shall be carried out by an accredited laboratory independent from the manufacturer based on ISO/IEC Guide 25/17025 and the test reports submitted shall be of the tests conducted within last 7 (seven) years to the date of bid opening.</li> <li>b. Results of type tests shall have been conducted within the last seven years prior to the date of tender submission. The bidder shall submit contact details (Title, email and fax) of certifying laboratory.</li> <li>c. Testing materials and equipment in Type Test Reports shall have the same code/ country/ manufacturer and technical parameters as offered materials and equipment. Type tests of non-conforming materials/equipment shall not be accepted.</li> <li>d. Type test reports shall include all items tested and results confirming that they meet the requirements of applied standards as stipulated in Tender Documents</li> </ol>
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Has been revised as follows:

ITB 11.2 (i)	<p>5. Copies of Type Test Reports and technical documents (catalogues, brochures, drawings) of each major equipment offered shall form</p>
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	<p>part of the bid. Copies of Type Test Reports shall meet the following requirements:</p> <ol style="list-style-type: none"> <li>All equipment being supplied shall conform to Type Tests as per Technical Specifications. Type test reports shall be carried out by an accredited laboratory independent from the manufacturer based on ISO/IEC Guide 25/17025 and the test reports submitted shall be of the tests conducted within last 10 (ten) years to the date of bid opening.</li> <li>Results of type tests shall have been conducted within the last ten years prior to the date of tender submission. The bidder shall submit contact details (Title, email and fax) of certifying laboratory.</li> <li>Testing materials and equipment in Type Test Reports shall have the same code/ country/ manufacturer and technical parameters as offered materials and equipment. Type tests of non-conforming materials/equipment shall not be accepted.</li> <li>Type test reports shall include all items tested and results confirming that they meet the requirements of applied standards as stipulated in Tender Documents</li> </ol>
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42. Section VII - Employer's Requirements- E – Schedules of Technical Information, z) Tariff Metering System item 1.7 which reads as follows:

z) TARIFF METERING SYSTEM		UNIT	DATA	
			REQUIRED	OFFERED
1.0	TARIFF METER			
1.7	Accuracy Class	VA	50	
	Watt hour (IEC 62053-22)		0.2s	
	VAr hour (IEC 62053-23)		2.0	

Has been revised to :

z) TARIFF METERING SYSTEM		UNIT	DATA	
			REQUIRED	OFFERED
1.0	TARIFF METER			
1.7	Accuracy Class	VA	50	

	Watt hour (IEC 62053-22)		0.2s	
	VAr hour (IEC 62053-23)		0.2s	

43. BS EN codes shall take precedence over BS codes where applicable. Consequently, all structural design shall primarily reference BS EN standards. Reference to older BS codes may apply where no direct BS EN equivalent is available.
44. The reliability Level for weather-related loads i.e. return period shall be 50 years.

  
**Ag. SENIOR MANAGER, SUPPLY CHAIN**

**Attachments:**

- Attachment 1: Form of Bid Security- Bid Bond
- Attachment 2: Main access road Kimuka Substation
- Attachment 3: Kimuka-Internal Access Road Drawing
- Attachment 4: LILO Route Coordinates
- Attachment 5: Revised 14-5.Kimuka-400-220kV-Layout-SITE PLAN
- Attachment 6: Revised Section\_IV-Price\_Schedules
- Attachment 7: 400S tower clearance diagram
- Attachment 8: 400/220kV Kimuka Substation Security staff housing architectural drawing
- Attachment 9: 400/220kV Kimuka Substation Bay Control room Architectural drawing
- Attachment 10: Technical-Staff-Housing-Architectural drawing
- Attachment 11:400/220kV Kimuka Substation control building architectural drawing
- Attachment 12:400/220kV Kimuka Substation Guard House and telecom collocation room architectural drawing
- Attachment 13: Kimuka-400-220kV-GENERAL LAYOUT (SCOPE OF WORK) architectural drawing

## Attachment 1

### Form of Bid Security- Bid Bond

BOND NO. \_\_\_\_\_

BY THIS BOND \_\_\_\_\_ as Principal (hereinafter called "the Principal"), and \_\_\_\_\_, **authorized to transact business in** \_\_\_\_\_, as Surety (hereinafter called "the Surety"), are held and firmly bound unto \_\_\_\_\_ as Obligee (hereinafter called "the Employer") in the sum of \_\_\_\_\_<sup>2</sup>(\_\_\_\_\_), for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted a written Bid to the Employer dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_, for the construction of \_\_\_\_\_ (hereinafter called the "Bid").

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

- (a) withdraws its Bid prior to the Bid validity expiry date set forth in the Principal's Letter of Bid, or any extended date provided by the Principal; or
- (b) having been notified of the acceptance of its Bid by the Employer prior to the expiry date of the Bid validity or any extension thereto provided by the Principal, (i) fails or refuses to execute the Contract Form, if required; or (ii) fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

then the Surety undertakes to immediately pay to the Employer up to the above amount upon receipt of the Employer's first written demand, without the Employer having to substantiate its demand, provided that in its demand the Employer shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 28 days after the date of expiry of the Bid validity set forth in the Principal's Letter of Bid or any extension thereto provided by the Principal.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this \_\_\_\_ day of \_\_\_\_\_ 20\_\_.

Principal: \_\_\_\_\_

Surety: \_\_\_\_\_

Corporate Seal (where appropriate)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Printed name and title)

\_\_\_\_\_  
(Printed name and title)

<sup>2</sup> The amount of the Bond shall be denominated in the currency of the *Employer's Country* or the equivalent amount in a freely convertible currency.