



# KENYA REVENUE AUTHORITY

ISO 9001:2015 CERTIFIED

STANDARD TENDER DOCUMENT

## PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER

Tender Ref No: K R A / H Q S / NCB - 045/ 2 0 20 - 2 0 21

TIMES TOWER BUILDING  
P. O. BOX 48240-00100  
TEL: + 254 023 1090  
WWW.KRA.GO .KE NAIROBI, KENYA

REGISTER FOR ON-LINE PRE-BID MEETING HERE

**[PRE-BID CONFERENCE](https://kra.webex.com/webappng/sites/kra/meeting/info/b4691526b1764324bc9d6e30f304641f)**

<https://kra.webex.com/webappng/sites/kra/meeting/info/b4691526b1764324bc9d6e30f304641f>

PRE-BID DATE : 2<sup>ND</sup> MARCH, 2021

ON-LINE 11:00 AM

CLOSING DATE: 16<sup>TH</sup> MARCH 2021

TIME: 11:00 AM

TIMES TOWER

FEBRUARY, 2021

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# SECTION 1: INVITATION FOR TENDERS

Name: **PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**

Tender reference No.: **KRA/HQS/NCB-045/2020-2021**

1. The **Kenya Revenue Authority** invites sealed tenders for the **Proposed Refurbishment of Times Tower Data Center**.
2. Interested bidders must be registered and appear in the current Building Contractors register for National Construction Authority in the categories indicated in the evaluation criteria
3. A complete set of bidding documents in English may be obtained from KRA E-Procurement portal available on the KRA website [www.kra.go.ke](http://www.kra.go.ke). Prospective bidders should register for E- Procurement to enable them access the KRA portal under "New Supplier Registration" found under the Tender Tab. For enquiries email to: [eprocurement@kra.go.ke](mailto:eprocurement@kra.go.ke)
4. Prices quoted should be net inclusive of all taxes, must be in Kenya shillings and shall remain valid for **335 days** from the closing date of tender.
5. An **On-Line Pre-Bid Briefing** is scheduled for **2<sup>nd</sup> March 2021 at 11:00 am**. Bidders are advised to register for pre-bid through this link [PRE-BID CONFERENCE](#).
6. Completed Bids are to be saved as PDF documents marked "**KRA/HQS/NCB- 045/2020-2021: Proposed Refurbishment of Times Tower Data Center**"
  - i. The Tender to be submitted to the appropriate KRA Supplier Portal found on the KRA web so as to be received on or before **16<sup>TH</sup> MARCH 2021 at 11.00 a.m.**
  - ii. An **original hard copy** of the Bid Security of not less than the indicated amount or equivalent amount freely convertible currency must be dropped in the **Tender security Box** located at **Times Tow Building**, Ground Floor any day before the tender closing date. The Bid Security must be in a seal envelope bearing the Tender Description and addressed to the address indicated below:

## Deputy Commissioner-Supply Chain Management

Times Tower Building, 21st Floor  
P.O. Box 48240 -00100 GPO, Tel:  
+254 20 310900  
Nairobi, Kenya  
website: [www.kra.go.ke](http://www.kra.go.ke)  
Email: [eprocurement@kra.go.ke](mailto:eprocurement@kra.go.ke)

**Any canvassing or giving of false information will lead to automatic disqualification.**

## **SECTION 2: INSTRUCTIONS TO TENDERERS**

## **INSTRUCTIONS TO TENDERERS**

### **1 General/Eligibility/Qualifications/Joint venture/Cost of tendering**

- 1.1 The Employer as defined in the Appendix to Conditions of Contract invites tenders for Works Contract as described in the tender documents. The successful tenderer will be expected to complete the Works by the Intended Completion Date specified in the tender documents.
- 1.2 All tenderers shall provide the Qualification Information, a statement that the tenderer (including all members of a joint venture and subcontractors) is not associated, or has not been associated in the past, directly or indirectly, with the Consultant or any other entity that has prepared the design, specifications, and other documents for the project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the Works, and any of its affiliates, shall not be eligible to tender.
- 1.3 All tenderers shall provide in the Form of Tender and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary.
- 1.4 In the event that pre-qualification of potential tenderers has been undertaken, only tenders from pre-qualified tenderers will be considered for award of Contract. These qualified tenderers should submit with their tenders any information updating their original pre-qualification applications or, alternatively, confirm in their tenders that the originally submitted pre-qualification information remains essentially correct as of the date of tender submission.
- 1.5 Where no pre-qualification of potential tenderers has been done, all tenderers shall include the following information and documents with their tenders, unless otherwise stated:
  - (a) copies of original documents defining the constitution or legal status, place of registration, and principal place of business; written power of attorney of the signatory of the tender to commit the tenderer;
  - (b) total monetary value of construction work performed for each of the last five years;
  - (c) experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed; and names and addresses of clients who may be contacted for further information on these contracts;

- (d) major items of construction equipment proposed to carry out the Contract and an undertaking that they will be available for the Contract.
- (e) qualifications and experience of key site management and technical personnel proposed for the Contract and an undertaking that they shall be available for the Contract.
- (f) reports on the financial standing of the tenderer, such as profit and loss statements and auditor's reports for the past five years;
- (g) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
- (h) authority to seek references from the tenderer's bankers;
- (i) information regarding any litigation, current or during the last five years, in which the tenderer is involved, the parties concerned and disputed amount; and
- (j) proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Price.

1.6 Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements, unless otherwise stated:

- (a) the tender shall include all the information listed in clause 1.5 above for each joint venture partner;
- (b) the tender shall be signed so as to be legally binding on all partners;
- (c) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
- (d) one of the partners will be nominated as being in charge, authorized to incur liabilities, and receive instructions for and on behalf of all partners of the joint venture; and
- (e) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge.

**1.7 To qualify for award of the Contract, tenderers shall meet the requirements as set in the criteria evaluation { Pages 19-25}**

- (a) annual volume of construction work of at least 2.5 times the estimated annual cash flow for the Contract;



- (b) experience as main contractor in the construction of at least two works of a nature and complexity equivalent to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete);
  - (c) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment listed as required for the Works;
  - (d) a Contract manager with at least five years' experience in works of an equivalent nature and volume, including no less than three years as Manager; and
  - (e) liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of no less than 4 months of the estimated payment flow under this Contract.
- 1.8 The figures for each of the partners of a joint venture shall be added together to determine the tenderer's Should comply with the minimum qualifying criteria of clause 1.7 (a) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 1.7 (a), (b) and (e) for an individual tenderer, and the partner in charge at least 40 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the joint venture's tender. Subcontractors' experience and resources will not be taken into account in determining the tenderer's Should comply with the qualifying criteria, unless otherwise stated.
- 1.9 Each tenderer shall submit only one tender, either individually or as a partner in a joint venture. A tenderer who submits or participates in more than one tender (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the tenderer's participation to be disqualified.
- 1.10 The tenderer shall bear all costs associated with the preparation and submission of his tender, and the Employer will in no case be responsible or liable for those costs.
- 1.11 The tenderer, at the tenderer's own responsibility and risk, is encouraged to visit and examine the Site of the Works and its surroundings, and obtain all information that may be necessary for preparing the tender and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the tenderer's own expense.
- 1.12 The procuring entity's employees, committee members, board members and their relative (spouse and children) are not eligible to participate in the tender.

1.13 The document shall be downloaded from the KRA website free of charge.

1.14 The procuring entity shall allow the tenderer to review the tender document free of charge before purchase.

## **2 Tender Documents**

2.1 The complete set of tender documents comprises the documents listed below and any addenda issued in accordance with Clause 2.4.

- (a) These Instructions to Tenderers
- (b) Form of Tender and Qualification Information
- (c) Conditions of Contract
- (d) Appendix to Conditions of Contract
- (e) Specifications
- (f) Drawings
- (g) Bills of Quantities
- (h) Forms of Securities

2.2 The tenderer shall examine all Instructions, Forms to be filled and Specifications in the tender documents. Failure to furnish all information required by the tender documents, or submission of a tender not substantially responsive to the tendering documents in every respect will be at the tenderer's risk and may result in rejection of his tender.

2.3 A prospective tenderer making an inquiry relating to the tender documents may notify the Employer in writing or by cable, telex or facsimile at the address indicated in the letter of invitation to tender. The Employer will only respond to requests for clarification received earlier than seven days prior to the deadline for submission of tenders. Copies of the Employer's response will be f o r w a r d e d to all persons issued with tendering documents, including a description of the inquiry, but without identifying its source.

2.4 Before the deadline for submission of tenders, the Employer may modify the tendering documents by issuing addenda. Any addendum thus issued shall be part of the tendering documents and shall be communicated in writing or by cable, telex or facsimile to all tenderers. Prospective tenderers shall acknowledge receipt of each addendum in writing to the Employer.

2.5 To give prospective tenderers reasonable time in which to take an addendum into account in preparing their tenders, the Employer shall extend, as necessary, the deadline for submission of tenders, in accordance with Clause 4.2 here below.

### 3 Preparation of Tenders

- 3.1 All documents relating to the tender and any correspondence shall be in English language.
- 3.2 The tender submitted by the tenderer shall comprise the following:
- (a) These Instructions to Tenderers, Form of Tender, Conditions of Contract, Appendix to Conditions of Contract and Specifications;
  - (b) Tender Security;
  - (c) Priced Bill of Quantities;
  - (d) Qualification Information Form and Documents;
  - (e) Alternative offers where invited; and
  - (f) Any other materials required to be completed and submitted by the tenderers.
- 3.3 The tenderer shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items for which no rate or price is entered by the tenderer will not be paid for when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities. All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause relevant to the Contract, as of 30 days prior to the deadline for submission of tenders, shall be included in the tender price submitted by the tenderer.
- 3.4 The rates and prices quoted by the tenderer shall only be subject to adjustment during the performance of the Contract if provided for in the Appendix to Conditions of Contract and provisions made in the Conditions of Contract.
- 3.5 The unit rates and prices shall be in Kenya Shillings.
- 3.6 Tenders shall remain valid for a period of **three hundred and thirty-five (335) days** from the date of submission. However in exceptional circumstances, the Employer may request that the tenderers extend the period of validity for a specified additional period. The request and the tenderers' responses shall be made in writing. A tenderer may refuse the request without forfeiting the Tender Security. A tenderer agreeing to the request will not be required or permitted to otherwise modify the tender, but will be required to extend the validity of Tender Security for the period of the extension, and in Should comply with Clause 3.7 - 3.11 in all respects.
- 3.7 The tenderer shall furnish, as part of the tender, a Tender Security in the amount and form specified in the appendix to invitation to tenderers. This shall be in the amount not exceeding 2 percent of the tender price

- 3.8 The format of the Tender Security should be in accordance with the form of Tender Security included in Section 10 - Standard forms or any other form acceptable to the Employer . Tender Security shall be valid for 30 days beyond the validity of the tender.
- 3.9 Any tender not accompanied by an acceptable Tender Security shall be rejected. The Tender Security of a joint venture must define as "Tenderer" all joint venture partners and list them in the following manner: a joint venture consisting of" .....", " ..... ",and ".....".
- 3.10 The Tender Securities of unsuccessful tenderers will be returned within 28 days of the end of the tender validity period specified in Clause 3.6.
- 3.11 The Tender Security of the successful tenderer will be discharged when the tenderer has signed the Contract Agreement and furnished the required Performance Security.
- 3.12 The Tender Security may be forfeited
- (a) if the tenderer withdraws the tender after tender opening during the period of tender validity;
  - (b) if the tenderer does not accept the correction of the tender price, pursuant to Clause 5.7;
  - (c) in the case of a successful tenderer, if the tenderer fails within the specified time limit to
    - (i) sign the Agreement, or
    - (ii) furnish the required Performance Security.
- 3.13 Tenderers shall submit offers that comply with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. Alternatives will not be considered, unless specifically allowed in the invitation to tender. If so allowed, tenderers wishing to offer technical alternatives to the requirements of the tendering documents must also submit a tender that complies with the requirements of the tendering documents, including the basic technical design as indicated in the Drawings and Specifications. In addition to submitting the basic tender, the tenderer shall provide all information necessary for a complete evaluation of the alternative, including design calculations, technical specifications, breakdown of prices, proposed construction methods and other relevant details. Only the technical alternatives, if any, of the lowest evaluated tender conforming to the basic technical requirements shall be considered.

- 3.14 The bidder shall submit technical proposal electronically via the supplier portal to Tech bid C-folder and financial proposals submitted electronically via the supplier portal to notes and attachment folder via the supplier portal in the respective folders within the tendering period.**
- 3.15 The tender shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the tenderer, pursuant to Clause 1.5 (a) or 1.6 (b), as the case may be. All pages of the tender where alterations or additions have been made shall be initialized by the person or persons signing the tender.
- 3.16 Clarification of tenders shall be requested by the tenderer to be received by the procuring entity not later than 7 days prior to the deadline for submission of tenders.
- 3.17 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.
- 3.18 The tender security shall be in the amount of **Kshs 1,000,000.00** and valid for **365 days**.

#### **4 Submission of Tenders**

- 4.1 Bidders to note that the TECHNICAL AND FINANCIAL proposal shall be submitted through the KRA supplier portal separately. The bidder shall submit technical proposal electronically via the supplier portal to Tech bid C-folder and financial proposals submitted electronically via the supplier portal to notes and attachment folder via the supplier portal in the respective folders within the tendering period.**
- 4.2 The Authority shall not accept Hard Copy Tenders
- 4.3 Any tender received after the deadline prescribed in clause 4.2 will be returned to the tenderer un-opened.
- 4.4 Tenderers may modify or withdraw their tenders after submission and resubmit to the respective folders. All prior submissions cannot be deleted or overwritten. Tenderer to note that the latest submissions shall be considered as the final version and all prior submissions shall be disregarded. No tender may be modified after the deadline for submission of tenders.**
- 4.5 Withdrawal of a tender between the deadline for submission of tenders and the expiration of the period of tender validity specified in the invitation to tender or as extended pursuant to Clause 3.6 may result in the forfeiture of the Tender Security pursuant to Clause 3.11.
- 4.6 Tenderers may only offer discounts to, or otherwise modify the prices of their tenders by submitting tender modifications in accordance with Clause 4.4 or be included in the original tender submission.

- 4.7 Tenderers must submit together with the tender document a work plan and indicate the lead time for long lead items.

## **5 Tender Opening and Evaluation**

- 5.1 The tenders will be opened by the Employer, including modifications made pursuant to Clause 4.4, in the presence of the tenderers' representatives who choose to attend at the time and in the place specified in the invitation to tender. Employer's representatives who are present during the opening shall sign a register evidencing their attendance.
- 5.2 The tenderers' names, the tender prices, the total amount of each tender and of any alternative tender (if alternatives have been requested or permitted), any discounts, tender modifications and withdrawals, the presence or absence of Tender Security, and such other details as may be considered appropriate, will be announced by the Employer at the opening. Minutes of the tender opening, including the information disclosed to those present will be prepared by the Employer.
- 5.3 Information relating to the examination, clarification, evaluation, and comparison of tenders and recommendations for the award of Contract shall not be disclosed to tenderers or any other persons not officially concerned with such process until the award to the successful tenderer has been announced. Any effort by a tenderer to influence the Employer's officials, processing of tenders or award decisions may result in the rejection of his tender.
- 5.4 To assist in the examination, evaluation, and comparison of tenders, the Employer at his discretion, may ask any tenderer for clarification of the tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, telex or facsimile but no change in the price or substance of the tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered in the evaluation of the tenders in accordance with Clause 5.7.
- 5.5 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender (a) meets the eligibility criteria defined in Clause 1.7;(b) has been properly signed; (c) is accompanied by the required securities; and (d) is substantially responsive to the requirements of the tendering documents. A substantially responsive tender is one Which conforms to all the terms, conditions and specifications of the tendering documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the works; (b) which limits in any substantial way, inconsistent with the tendering documents, the Employer's rights or the tenderer's obligations under the

Contract; or (c) whose rectification would affect unfairly the competitive position of other tenderers presenting substantially responsive tenders.

- 5.6 If a tender is not substantially responsive, it will be rejected, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 5.7 Tenders determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows:
- (a) where there is a discrepancy between the amount in figures and the amount in words, the amount in words will prevail; and
  - (b) where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there is an obvious typographical error, in which case the adjustment will be made to the entry containing that error.
  - (c) In the event of a discrepancy between the tender amount as stated in the Form of Tender and the corrected tender figure in the main summary of the Bill of Quantities, the amount as stated in the Form of Tender shall prevail.
  - (d) The Error Correction Factor shall be computed by expressing the difference between the tender amount and the corrected tender sum as a percentage of the corrected Builder's Work (i.e., Corrected tender sum less P.C. and Provisional Sums)
  - (e) The Error Correction Factor shall be applied to all Builder's Work (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuation of variations.
  - (f) the amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and, with concurrence of the tenderer, shall be considered as binding upon the tenderer. If the tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security may be forfeited in accordance with clause 3.11.
- 5.8 The Employer will evaluate and compare only the tenders determined to be substantially responsive in accordance with Clause 5.5.
- 5.9 In evaluating the tenders, the Employer will determine for each tender the evaluated tender price by adjusting the tender price as follows:
- (a) making any correction for errors pursuant to clause 5.7;

- (b) excluding provisional sums and the provision, if any, for contingencies in the Bill of Quantities, but including Day works were priced competitively.
- (c) making an appropriate adjustment for any other acceptable variations, deviations, or alternative offers submitted in accordance with clause 3.12; and
- (d) making appropriate adjustments to reflect discounts or other price modifications offered in accordance with clause 4.6

5.10 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in unsolicited benefits for the Employer will not be taken into account in tender evaluation.

5.11 The tenderer shall not influence the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. Any effort by the Tenderer to influence the Employer or his employees in his decision on tender evaluation, tender comparison or Contract award may result in the rejection of the tender.

5.12 There shall be no preference

## **6 Award of Contract**

6.1 Subject to Clause 6.2, the award of the Contract will be made to the tenderer whose tender has been determined to be substantially responsive to the tendering documents and who has offered the lowest evaluated tender price, provided that such tenderer has been determined to be (a) eligible in accordance with the provision of Clauses 1.2, and (b) qualified in accordance with the provisions of clause 1.7 and 1.8.

**This is in line with Section 86 (1) (a) of the Public Procurement and Asset Disposal Act, 2015. Which reads "*The successful tender shall be the one who meets any one of the following as specified in the tender document- The tender with the lowest evaluated price;*"**



- 6.2 Notwithstanding clause 6.1 above, the Employer reserves the right to accept or reject any tender, and to cancel the tendering process and reject all tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected tenderer or tenderers or any obligation to inform the affected tenderer or tenderers of the grounds for the action.
- 6.3 The tenderer whose tender has been accepted will be notified of the award prior to expiration of the tender validity period in writing or by cable, telex or facsimile. This notification (hereinafter and in all Contract documents called the "Letter of Acceptance") will state the sum (hereinafter and in all Contract documents called the "Contract Price") that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract. At the same time the other tenderers shall be informed that their tenders have not been successful.

The contract shall be formed on the parties signing the contract.

- 6.4 The Agreement will incorporate all agreements between the Employer and the successful tenderer. Within 14 days of receipt the successful tenderer will sign the Agreement and return it to the Employer.
- 6.5 Within 21 days after receipt of the Letter of Acceptance, the successful tenderer shall deliver to the Employer a Performance Security in the amount stipulated in the Appendix to Conditions of Contract and in the form stipulated in the Tender documents. The Performance Security shall be in the amount and specified form
- 6.6 Failure of the successful tenderer to comply with the requirements of clause 6.5 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Tender Security.
- 6.7 Upon the furnishing by the successful tenderer of the Performance Security, the Employer will promptly notify the other tenderers that their tenders have been unsuccessful.
- 6.8 Preference were allowed in the evaluation of tenders shall not be allowed for contracts not exceeding one year (12months)
- 6.9 The tender evaluation committee shall evaluate the tender within 30 days of the validity period from the date of opening the tender.
- 6.10 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.

- 6.11 Contract price variations shall not be allowed for contracts not exceeding one year (12 months)
- 6.12 Where contract price variation is allowed, the valuation shall not exceed 15% of the original contract price.
- 6.13 Price variation request shall be processed by the procuring entity within 30 days of receiving the request.
- 6.14 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.
- 6.15 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.
- 6.16 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.

## **7 Corrupt and Fraudulent practices**

- 7.1 The procuring entity requires that tenderers observe the highest standards of ethics during procurement process and execution of contracts. A tenderer shall sign a declaration that he has not and will not be involved in corrupt and fraudulent practices

## **SECTION 3: APPENDIX TO INSTRUCTIONS OF TENDERERS**

The following clauses shall be amended as follows:

**Clause 1.4:** Delete the entire clause

**Clause 1.5:** To read "This invitation to tender is open to all eligible tenderers as per the tender invitation notice"

**Clause 1.5 (a) Requirements in the Evaluation Criteria Shall Prevail**

**Clause 1.5 (c) Requirements in the Evaluation Criteria Shall Prevail**

**Clause 1.5 (d) Delete the entire Clause**

**Clause 1.7 Requirements in the Evaluation Criteria Shall Prevail**

**Clause 1.7 (d) Requirements in the Evaluation Criteria Shall Prevail**

**Clause 1.7 (e)** Introduce the following:-

e) The following tenders shall also be considered non-responsive: - Incomplete and/or unsigned form of tender

**Clause 3.2** For the requirement of this clause; add the following (g) Appendix to the Instruction to Bidders

**Clause 3.6** Amend the first sentence to read as follows: "Tenders shall remain valid for a period of **335** days from the date of submission"

## SECTION 4: TENDER EVALUATION CRITERIA

### (A) MANDATORY REQUIREMENTS

#### TENDER EVALUATION CRITERIA

After tender opening, the tenders will be evaluated in 4 stages, namely:

1. Preliminary Evaluation;
2. Technical Evaluation;
3. Financial Evaluation; and
4. Recommendation for Award.

### STAGE 1: PRELIMINARY /MANDATORY EVALUATION.

#### PRELIMINARY EVALUATION

This stage of evaluation shall involve examination of the mandatory requirements as set out in the tender Advertisement Notice or Letter of invitation to Tender and any other conditions stated in the bid document.

Bidders must provide the following information/ documents.

S/No	MANDATORY REQUIREMENTS
1.	Tender Security – A bid bond from a reputable bank or Approved insurance company by PPRA of <b>Kshs. 1,000,000.00</b> . Original to be deposited in the tender box and should be valid for <b>365 days</b> from the date of submission.
2.	Valid copy Certificate of Company Incorporation /Business Registration,
3.	Valid Tax Compliance Certificate;
4.	Details of Directorship / Ownership (Attach Certified copy of current CR12;
5.	Must attach duly completed, filled, signed and stamped confidential business questionnaire;
6.	Letter from the bank or a CBK approved financial institution indicating that the firm is currently operating an account.
7.	Provide Letter of Credit Minimum amount of KES 50,000,000.00 (Fifty Million)
Arithmetical errors: Any errors in the submitted tender arising from a miscalculation of unit price, quantity, sub total and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive	

8.	<p>i. Current National Construction Authority Practicing Licenses for the following categories:</p> <ul style="list-style-type: none"> <li>a) Electrical Installations – Minimum NCA 3</li> <li>b) Air-conditioning Installations – Minimum NCA 3</li> <li>c) Fire Fighting Installations – Minimum NCA 4</li> <li>d) Builder’s Works – Minimum NCA 4</li> </ul> <p>ii. Current practicing licensing for <b>Energy and Petroleum Regulatory Authority</b> for the lead company should a minimum of <b>Class A1</b>.</p>
9.	<p>If a firm does not possess all the above certificate, they are free to partner with a qualified firm either as a joint ventures or consortiums. Further the following will be included:</p> <ul style="list-style-type: none"> <li>a) Joint venture clearly stating the joint venture lead partner</li> <li>b) Consortium agreements clearly stating the lead partner</li> </ul> <p>However, the lead should satisfy the requirement in <b>No. 8 above</b> and clause i (a) and ii of requirements.</p>
10	<p>Power of Attorney (Sole Proprietors Exempted) from the firm duly signed by director(s) and stamped or Commissioner of Oaths</p>
11	<p>Manufacturer letter of Authority specifically addressed to Kenya Revenue Authority and quoting the tender name and number for the following affirming compliance to specifications described in the bills of quantities:</p> <ul style="list-style-type: none"> <li>a) Generator Equipment</li> <li>b) CCTV Equipment and Access Control System (<b>Backend software to be unified and from the same manufacturer</b>)</li> <li>c) Electrical Switchgear.</li> <li>d) UPS Equipment, UPS Input Board, Power Distribution Frame Smart Integrated Rack, Racks and Containment, in rack</li> </ul> <p>Air-conditioning Equipment, Data Center Infrastructure Management System (<b>to be from the same manufacturer</b>)</p> <ul style="list-style-type: none"> <li>e) Fire Detection Equipment and Fire Suppression Equipment (<b>to be from the same manufacturer</b>)</li> <li>f) Raised Flooring System.</li> <li>g) Factory pre terminated copper and fiber trunks</li> </ul>

12	Commitment letter from the bidder for the following: <ol style="list-style-type: none"> <li>a) Involve the original equipment manufacturers' representatives during training and knowledge transfer.</li> <li>b) Undertake Support and Maintenance as per Manufacturers recommended procedures.</li> </ol>
13	Confirmation that the original Equipment Manufacturer for the following items has support offices locally for the following: <ol style="list-style-type: none"> <li>1. UPS Equipment</li> <li>2. Data Center Infrastructure Management System.</li> <li>3. Precision Air-conditioning Equipment</li> </ol>
14	Proof of Site Visit attendance A site visit is mandatory and shall be held on <b>26<sup>th</sup> February 2021 &amp; 1<sup>st</sup> March 2021</b> <b>Contact Officer : Francis Kungu (0727-329-258) &amp; Samuel Mbuti (0722-634-240)</b>
<b>Arithmetical errors:</b> Any errors in the submitted tender arising from a miscalculation of unit price, quantity, subtotal and total bid price shall be considered as a major deviation that affects the substance of the tender and shall lead to disqualification of the tender as non-responsive.	

#### NOTE

**At this stage, the tenderer's submission will either be responsive or non-responsive. The non-responsive submissions in any of the above mandatory requirements will be eliminated from the entire evaluation process and will not be considered further.**

The employer/procuring entity may seek further clarification/confirmation if necessary, to confirm authenticity/Should comply of any condition of the tender. Further, in case of a discrepancy between the amounts stated in the appendix to instruction to tenderers and the one stated in the advertisement or invitation letter, the bid security shall be taken as the amount in the advertisement/ letter of invitation.

## **STAGE 2: TECHNICAL EVALUATION**

The tender document shall be examined based on clause 2.02 of the Instruction to Tenderers which states as follows:

In accordance with clause 2.02 of Instruction to Tenderers, the tenderers will be required to provide evidence for eligibility of the award of the tender by satisfying the employer of their eligibility under sub clause 2.01 of Instructions to Tenderers and their capability and adequacy of resources to effectively carry out the subject contract.

In order to comply with provisions of clause 2.02 of Instruction to Tenderers, the tenderers shall be required;

To fill the Standard Forms provided in the bid document for the purposes of providing the required information. The tenderers may also attach the required information if they so desire;

To supply equipment's/items which comply with the technical specifications set out in the bid document. In this regard, the bidders shall be required to submit relevant technical brochures/catalogues with the tender document, highlighting the Catalogue Numbers of the proposed items. Such brochures /catalogues should indicate comprehensive relevant. data of the proposed equipment/items which should include but not limited to the following:

**Table 1: Vendor Evaluation**

Item	Description	Points Scored	Max.Point
<b>A) Reference Site</b>			
Proof of having successfully undertaken <b>one similar project (Attach Reference Letter from Client as proof)</b>			
1	Engaged as Lead or Electrical Contractor -5		5
	Not Engaged as Lead or Electrical Contractor – 0		
<b>Capacity rating of the reference site</b>			5
More than 30 racks capacity. -5			
Between 20 -30 racks - 2			
Less than 20 racks - 0			
<b>Project Value of Reference site</b>			5
The value of works should Kenya Shillings 150,000,000.00 (In words One Hundred and Fifty Million). Or more ---5			
The value of works is less than Kenya Shillings 150,000,000.00 (In words One Hundred and Fifty Million) - 0			
<b>Sub-Total for Refence Sites carried forward to summary page for table 1</b>			<b>15</b>
<b>B) Key Personnel (Attach evidence- Curriculum Vitae, Academic and Profession Certificates) )</b>			
1.	<b>Electrical Supervisor</b> Minimum holder of a diploma in Electrical Engineering field and Class A1 license form EPRA.....5 Holder of certificate in Electrical Engineering field.....3 Holder of trade test certificate in Electrical engineering field.....1 No relevant certificate.....0.		5
2.	<b>Air-Conditioning Supervisor</b> Minimum holder of a diploma in Mechanical Engineering related field.....5 Holder of certificate in Mechanical Engineering related field.....3 Holder of trade test certificate in Mechanical engineering related field.....2 No relevant certificate.....0		5



3.	<b>Fire Fighting Supervisor</b> Minimum holder of a diploma in Mechanical Engineering related field..... <b>5</b> Holder of certificate in Mechanical Engineering related field..... <b>3</b> Holder of trade test certificate in Mechanical engineering related field..... <b>2</b> No relevant certificate..... <b>0</b>		5
4.	<b>Building/Civil Works Supervisor</b> Minimum holder of a diploma in Building/Civil Engineering related field..... <b>5</b> Holder of certificate in Building/Civil Engineering related field..... <b>3</b> Holder of trade test certificate in Building/Civil engineering related field..... <b>2</b> No relevant certificate..... <b>0</b>		5
<b>Sub-Total for Key Personnel carried forward to summary page for table 1</b>			20

Detailed Scoring for table 1

Total Brought Forward		Bidders Score	Cut -off Score	Maximum Score
1.	From Table 1.(A)		12	15
2.	From Table 1.(B)		12	20
<b>Sub Total (Carried to Table 3)</b>			<b>24</b>	<b>35</b>

**The Cut-off mark under Table 1 is 24 Marks, any bidder not attaining this pass-mark will not proceed to table 3.**

## Table 2: Equipment Standards Requirement

### Instructions to Bidders – (General).

1. The Bidder MUST provide a response for all the features irrespective of any attached Technical Documents
2. Bidders MUST provide a substantive response in the format provided., irrespective of any attached technical document. **Use of Yes, No, tick, Compliant etc in these tables will be considered non-responsive.**
3. **Any Brochures or Write- ups attached should be cross referenced to the technical specifications**
4. Bidders **MUST** append official company stamp and/or authorized signature on all attached technical data sheets.
5. Bidders to Note that the tables referred to will be read in conjunction with specifications and bills of quantities during project delivery.
6. **Bidders will be awarded 1 mark for compliance to each clause in table 2 A to J and 0 mark for non compliance. Each table will have cut-off marks as indicated below**

**2.(A) FIRE EXTINGUISHING SYSTEM.**

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
<b>CO<sub>2</sub> FIRE EXTINGUISHING SYSTEM</b>					
1.	Pipelines	<b>Seamless black steel schedule 40 Pipes</b>			1
2.	Cylinder	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Third Party certification: UL Listed</b>			1
3.	Nozzles	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Orientation:360<sup>0</sup></b>			1
	Operation	<b>Means of actuation: Point heat detector.</b>			1
4.	Plant and Equipment identification	<b>Self-adhesive color pipe bands</b>			1
5.	Actuation Mechanism	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Third Party certification: UL Listed</b>			1
<b>IG541 FIRE EXTINGUISHING SYSTEM</b>					
6.	Pipelines	<b>Seamless black steel schedule 40 Pipes</b>			1
7.	Cylinder	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Third Party certification: UL Listed</b>			1
8.	Nozzles	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Orientation: Acoustic type UL Listed</b>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
	Operation	<b>Means of actuation:</b> Point Smoke detector.			1
9.	Plant and Equipment identification	<b>Self-adhesive color pipe bands</b>			1
10	Pressure Vents	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Third Party certification:</b> UL Listed			1
11	Actuation Mechanism	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Third Party certification:</b> UL Listed			1
12	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					14

## **2.(B) GENERATOR AND FUEL OIL SUPPLY SYSTEM.**

<b>Item</b>	<b>Features</b>	<b>Minimum Specification</b>	<b>Bidders' Response</b>	<b>Marks</b>	<b>Max Score</b>
1.	Generator	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>Manufacturers Letter affirming the following:</p> <ul style="list-style-type: none"> <li>• Set Manufactured to ISO 8528</li> </ul> <p>Rating 350 KVA Continuous Running.</p>			1
2.	Diesel Transfer Pump	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>Diesel transfer electric, displacement, self-priming rotary electric vane pumps fitted with bypass valve.</p>			1
3.	Storage tanks	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Carbon steel oil tanks –</b> Above Ground.</p> <p><b>Standards:</b> To AS 1940 Built to AS 1693 CAT 3.</p> <p><b>Arrangement:</b> Integrally banded, double skin, suitable for above-ground use.</p> <p><b>Integral bund</b></p>			1
4.	Tank Filling Point	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>Pad mountable, open construction pump set with weatherproof and lockable fill box with spill containment sump and weatherproof and lockable control box.</p>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
5.	Fuel Polishing Equipment	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>The system/equipment to have the following features;</p> <ul style="list-style-type: none"> <li>• <b>40 Liters per Minute</b></li> <li>• <b>Strainer, 100 mesh</b></li> <li>• <b>Pre filter, 10 micron</b></li> <li>• <b>Final Filter, 2 micron</b></li> <li>• <b>Water Separator , 5 ppm</b></li> <li>• <b>UL 508 Digital PLC based controller, Network compatible.</b></li> </ul>			1
6.	Automatic Tank Gauging System	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>The system to offer the following features;</p> <ul style="list-style-type: none"> <li>• High Product</li> <li>• Low Product</li> <li>• High Water</li> <li>• Theft</li> <li>• Leak Test Failed</li> <li>• Leak Test Required</li> <li>• Generator Usage Report.</li> </ul>			1
7.	Secondary containment	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>Liquid fuel tank drip trays  <b>Arrangement:</b> Removable.  <b>Capacity:</b> 1000 Liters</p>			1
8.	Supply pipelines	<p><b>Stainless steel pipelines</b>  <b>Standards:</b> To BS EN 10357.</p>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
		<b>Finish:</b> Polished. <b>Jointing method:</b> Press fit.			
9.	Plant and equipment identification	<b>Self-adhesive color pipe bands</b>			1
10	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					10

### 2.(C) AIR CONDITIONING SYSTEM.

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
<b>PRECISION AIR CONDITIONING SYSTEM</b>					
1.	General	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>The system to offer the following features;</p> <p><b>Casing Material:</b> Galvanized sheet steel.</p> <p><b>Finish:</b> Powder Coated.</p> <p><b>Air Filter :</b> G4</p> <p><b>Humidification (minimum) :</b> 3kg/hr</p> <p><b>Fans:</b> EC</p> <p><b>Humidity Sensor</b></p> <p><b>Water leak detection.</b></p> <p><b>Refrigerant Type:</b> R410 A</p> <p><b>Power Supply:</b> Dual.</p>			1
<b>VRF AIR CONDITIONING SYSTEM</b>					
2.	VRF Outdoor Unit	<b>The bidder should provide name of brand/manufacturer.</b>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
		<p>The unit to have the following features;</p> <p><b>Output cooling (Minimum):</b> 28 kW</p> <p><b>Electrical supply type:</b> Three phase.</p> <p><b>Compressor:</b> Twin scroll.</p> <p><b>Compressor fan type:</b> Propeller.</p> <p><b>Drive:</b> Inverter.</p> <p><b>Refrigerant:</b> R410A.</p> <p><b>Accessories:</b> Discharge temperature sensors. High pressure sensors. High pressure switch. Internal compressor crankcase heater. Internal overload relay. Low pressure switch. Overcurrent relay. Overcurrent sensor. Reverse phase protection. Suction temperature sensors.</p>			
3.	System	Two pipe cooling only			1
4.	Pipelines	<p><b>Copper refrigerant pipelines</b></p> <p><b>Standard:</b> To BS EN 378-2.</p> <p><b>Pipelines:</b> To BS EN 12735-1.</p>			1
5.	Thermal insulation	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Nitrile rubber insulation</b></p>			1
6.	Plant and equipment identification	<p><b>Engraved mechanical plant and equipment identification labels</b></p> <p><b>Material:</b> Screen printed plastic.</p>			1
7.	Installation Testing and Commissioning	<p><b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b></p>			1



Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
<b>Sub Total (Carried forward to Table 2)</b>					7

**2.(D) ELECTRICAL DISTRIBUTION SYSTEMS.**

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
<b>Low-Voltage Distribution System</b>					
1.	Electrical diagrams	<b>Material:</b> Engraved plastics laminate.			1
2.	Electrical shock treatment signs	<b>Format:</b> Plastics encapsulated.			1
3.	Equipment labels and warning notices	<b>Material:</b> Face engraved rigid plastic laminate.			1
4.	Warning marker tapes	<b>Standard:</b> To BS EN 12613, Type 1. <b>Material:</b> Polyethylene.			1
5.	Cubicle switchboards	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standards:</b> To BS EN 61439-1 and BS EN 61439-2. (IEC)			1
6.	Distribution boards	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standards:</b> To BS EN 61439-1 and BS EN 61439-3.			1
7.	Uninterruptible power supply (UPS) units	<b>The bidder should provide name of brand/manufacturer.</b>  The UPS to have the following features;  <b>Standards:</b> To BS EN 62040-1 and BS EN 62040-3. <b>Modular Type:</b> Maximum rating of Module to be 50kW and Hot swappable. <b>Mode of operation:</b> On-line, double conversion. <b>Configuration:</b> Single with bypass (static and external by-pass). <b>Load compatibility:</b> Suitable for use with loads operating at any power			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
		<p>factor (leading or lagging) up to 0.9.</p> <p><b>Input</b></p> <ol style="list-style-type: none"> <li><b>Nominal voltage:</b> Three phase 400 V A.C.</li> <li><b>Voltage tolerance:</b> ±10% at full load.</li> <li><b>Frequency:</b> 50 Hz. ±2%.</li> <li><b>Power factor:</b> &gt;0.98 at full load.</li> <li><b>Input current distortion (THDi):</b> &lt;3% at full load.</li> </ol> <p><b>Battery:</b></p> <ol style="list-style-type: none"> <li><b>Cell Material:</b> Lithium Ion</li> <li><b>Battery monitors</b> <b>Type:</b> Microprocessor based. <b>Features:</b> <ul style="list-style-type: none"> <li>Monitoring</li> <li>Battery Level</li> <li>System Level</li> <li>Alarm Monitoring.</li> </ul> </li> </ol>			
8.	UPS INPUT Board	<b>Footprint Not more than 900mm X 900mm X 2000mm (LxWxH).</b>			1
9.	Cable ladders	<p><b>Material:</b> Metal.</p> <p><b>Resistance against flame propagation:</b> Non-flame-propagating.</p> <p><b>Electrical properties</b></p> <ol style="list-style-type: none"> <li><b>Continuity characteristics:</b> Without electrical continuity.</li> <li><b>Conductivity characteristics:</b> Without electrical</li> </ol>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
		conductive system component. <b>Coating material:</b> Powder coating.			
10	Multicore screened thermosetting-insulated (LSHF) sheathed cables Operating Maximum Temperature 90 degrees Celsius.	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standard:</b> To BS EN 8436. <b>Type:</b> Cu/XLPE/PVC/SWA/PVC.			1
11	Single-core non-sheathed (LSHF) insulated cables Operating Maximum Temperature 70 degrees Celsius.	<b>Standards:</b> To BS EN 50525-1 and BS EN 50525-3-41. <b>Type:</b> Cu/XLPE/PVC/SWA/PVC.			1
12	Miniature circuit breakers	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standards:</b> To BS EN 60898-1 and BS EN 60898-2.			1
13	Dynamic Power Factor Correction and Harmonic Filter.	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Reactive power rating:</b> Programmable from 0.6 inductive to 0.98 capacitive. <b>Filter Characteristics:</b> <ul style="list-style-type: none"> <li>Harmonic Range: 2<sup>nd</sup> to 50<sup>th</sup> Order.</li> </ul> <b>Enclosure Ingress protection (minimum):</b> To BS EN 60529, IP41.			1
14	Automatic Voltage Stabilizer	<b>The bidder should provide name of brand/manufacturer.</b>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
		<b>Input Rating:</b> 415V +/- 25%(3P + N). <b>Output:</b> 400 +/- 1% (3P+N).			

<b>Hardwired general lighting systems</b>					
15	Light-duty PVC-insulated and sheathed flexible cables	<b>Standards:</b> To BS EN 50525-1 and BS EN 50525-2-11. <b>Cable type:</b> PVC			1
16	PVC-insulated and sheathed cables	<b>Standard:</b> To BS 6004.			1
17	Dimmer switches and controls	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Actuating method:</b> Touch screen. <b>Control functions:</b> Dim up and down. <b>Mounting:</b> Flush. <b>Material:</b> Aluminium. <b>Finish:</b> Polished.			1
18	Plate switches	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standard:</b> To BS EN 60669-1. <b>Actuating method:</b> Rotary switch.			1
19	Self-ballasted LED lamps	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standards:</b> To BS EN 62560 and BS EN 62612. <b>Third-party certification:</b> BSI Kitemark-approved.			1
20	Emergency luminaires	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Standards:</b> To BS EN 60598-1, BS 4533-102-1 and BS EN 60598-2-22 . <b>Third-party certification:</b> ENEC mark. <b>Internal backup power.</b>			1

21	Recessed luminaires	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Standards:</b> To BS 4533-102-19.  <b>Third-party certification:</b> ENEC+ mark.</p>			1
22	Surface luminaires	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Standard:</b> To BS EN 60598-1 and BS 4533-102-1.</p>			1
23	Suspended luminaires	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Standards:</b> To BS EN 60598-1 and BS 4533-102-1.  <b>Third-party certification:</b> ENEC+ mark.</p>			1
24	Occupancy detectors	<p><b>Standards:</b> To BS EN 60669-1 and BS EN 60669-2-1.  <b>Sensor type:</b> Passive infrared.</p>			1
<b>EARTHING AND BONDING</b>					
25	Earth Matt	<p><b>Material:</b> Lattice copper to BS EN 13601.  <b>Size:</b> 600 x 600 x 3 mm</p>			1
26	Main protective bonding conductors	<p><b>PVC-insulated single core non-sheathed cables</b>  <b>Standards:</b> To BS EN 50525-1 and BS EN 50525-2-31.</p> <p><b>Copper earth tapes</b>  <b>Standards:</b> To BS EN 13601.  <b>Finish:</b> Bare.  <b>Size:</b> 25 x 6 mm  <b>Cover:</b> Green/ yellow PVC.</p>			1
27	Supplementary protective bonding conductors	<p><b>Standards:</b> To BS EN 50525-1 and BS EN 50525-2-31</p>			1
28	Circuit protective conductors	Cable armor and auxiliary.			1
29	Earth terminal type	<p>Material:</p> <ul style="list-style-type: none"> <li>• <b>Bar type:</b> Hard drawn copper to BS EN 13601.</li> </ul>			1

		<ul style="list-style-type: none"> <li>• <b>Finish:</b> Bare.</li> <li>• <b>Support:</b> PVC-U.</li> </ul>			
30	Electrical identification	<b>Material:</b> Face engraved rigid plastic laminate.			1
31	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					31



## 2.(E) CARD ACCESS CONTROL SYSTEMS

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
1.	System type	Networked.			1
2.	Equipment interconnectivity	Wired.			1
3.	Control software and Hardware	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>Resident on site server.</p>			1
		<p><b>Backup Mode Operation</b></p>			1
4.	Integration to existing Access Control Systems	<ol style="list-style-type: none"> <li>1. Apollo Access Control System in Building 1</li> <li>2. Genetec Access Control System in Building 2</li> </ol>			1
5.	Method of authorization	Biometric credentials.			1
6.	Readers	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Biometric fingerprint readers</b></p> <p><b>Security grading:</b> To BS EN 60839-11-1, Grade 3.</p>			1
7.	Locking mechanisms	<p><b>Magnetic locks</b></p> <p><b>Standard:</b> To BS EN 13637, when used on escape routes.</p>			1
8.	Controls	<p><b>Access control units</b></p> <p><b>Standards:</b> To BS EN 60839-11-1 and BS EN 60839-11-2.</p>			1
9.	Door status monitoring	<p><b>Door status monitoring devices</b></p> <p><b>Security grading:</b> To BS EN 60839-11-1, Grade 3.</p>			1

<b>Item</b>	<b>Features</b>	<b>Minimum Specification</b>	<b>Bidders' Response</b>	<b>Marks</b>	<b>Max Score</b>
10	Integration with CCTV System	<b>Must share same database (Unified System).</b>			1
11	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					12

## 2.(F) CCTV SYSTEM

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
1.	Video motion detection software	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Operating system:</b> Windows 10</p> <p><b>Functions:</b> User definable areas of interest and masking. Motion detection. Object detection. People counting. Recognition. Tamper detection. Video tracking</p>			1
2.	Integration to building CCTV System.	<p>System being able to be run by minimum two administrators.</p> <ol style="list-style-type: none"> <li>1. Local Admin (IT Department)</li> <li>2. External Admin (Security Department)</li> </ol>			1
3.	Surveillance system signs	<b>Material:</b> Engraved Plastic.			1
4.	Network video recorders	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p>RAID 5, RAID 6, 1080p/5MP/UHD,H.265/H.264, ONVIF, RTSP MOUNT, 2X Gigabit Ethernet, Max Drives supported 16, Base System Capacity 20TB, External Support for ISCSI, Backup mode Automatic ( <b>NVR to be same Manufacturer as the VMS software</b>).</p>			1
		<b>Backup Mode Operation</b>			1
5.	Bullet cameras	<b>The bidder should provide name of brand/manufacturer.</b>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
		5 Megapixel, IR, IP bullet cameras, SD Card, 30 fps, POE.			
6.	Micro dome cameras	<b>The bidder should provide name of brand/manufacturer.</b>  4 Megapixel, IR, IP bullet cameras, SD Card, 30 fps, POE.			1
7.	Dome Camera	<b>The bidder should provide name of brand/manufacturer.</b>  5 Megapixel, IR, IP bullet cameras, SD Card, 30 fps, POE.			1
8.	Integration with Access Control	Must Share same database with access control system.(Unified System)			1
9.	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					10

## **2.(G) FIRE DETECTION AND ALARM SYSTEMS.**

<b>Item</b>	<b>Features</b>	<b>Minimum Specification</b>	<b>Bidders' Response</b>	<b>Marks</b>	<b>Max Score</b>
1.	System type	Addressable			1
2.	Equipment interconnectivity	<b>Fire-resistant screened (LSHF) cables</b>  <b>Standard:</b> To BS 7629-1.			1
3.	Fire Alarm Panels	<b>The bidder should provide name of brand/manufacturer.</b>  <b>Conforms to EN54 standard.</b>			1
4.	Output to Main Building Fire alarm system	Dry Contact Output Connection to Main Building fire alarm panel			1
5.	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					<b>5</b>

**2.(H) BUILDING MONITORING AND MANAGEMENT SYSTEMS**

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
1.	<p><b>Data center Infrastructure Management system.</b></p>	<p><b>The bidder should provide name of brand/manufacturer.</b></p> <p><b>Digital Visualization</b></p> <p>The solution should be MUST be supplied and installed with the following features <b>(Mandatory Features).</b></p> <ul style="list-style-type: none"> <li>• 3Dimensional</li> <li>• Temperature Neophram.</li> <li>• System/ Device Integration for north and southbound interfaces.</li> <li>• Device Monitoring</li> <li>• Big Screen Display</li> <li>• Alarm Management.</li> <li>• Power diagram Visualization,</li> <li>• Cooling diagram Visualization.</li> <li>• Report Management</li> <li>• Work Order Management.</li> <li>• Capacity Management.</li> <li>• Asset Management.</li> </ul>			1
2.	Other features	<p>The solution to also support the following features</p> <ul style="list-style-type: none"> <li>•Energy Efficiency Management</li> <li>•Cooling optimization</li> <li>•Electronic operations and maintenance manuals</li> </ul>			1

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
3.	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					

## **2.(I) VIDEO WALL**

<b>Item</b>	<b>Features</b>	<b>Minimum Specification</b>	<b>Bidders' Response</b>	<b>Marks</b>	<b>Max Score</b>
1.	Video Wall Screens	<b>The bidder should provide name of brand/manufacturer.</b>  3mm Bezel Width			1
2.	Multi-Screen Controller	<b>The bidder should provide name of brand/manufacturer.</b>  Matrox 8 by 6 input/output			1
3.	Installation Testing and Commissioning	<b>Should comply with specifications in Section 8 and Bills of Quantities in Section 10 of this document.</b>			1
<b>Sub Total (Carried forward to Table 2)</b>					3



## 2.(J) MAINTENANCE AND WARRANTY

Item	Features	Minimum Specification	Bidders' Response	Marks	Max Score
1.	Defects Liability Period.	Confirmation that bidder shall abide by defects liability period as indicated in the bill of quantities.			1
2.	Post defects liability support	Confirmation that bidder shall perform support as indicated in the bill of quantities.			1
3.	Warranty	Confirmation that bidder shall abide by warranty as indicated in the bill of quantities.			1
4.	Maintenance and Operations manuals	Confirmation that bidder shall submit the maintenance and Operations Manuals as indicated in the bill of quantities.			1
5.	User Training	Confirmation that bidder shall undertake user training as indicated in the bill of quantities.			1
6.	Onsite Knowledge transfer	On site Knowledge, transfer on all critical components.			1
7.	Work Plan	Bidder should submit detailed work plan for implementation of the entire scope and with a <b>delivery timeline of not more than six (6) months.</b>			1
8.	End of Life Support	Bidder confirmation that no proposed solution or product will be nearing end of life in the next three years at the time of tender award.			1
<b>Sub Total (Carried forward to Table 2)</b>					<b>8</b>

**The detail-scoring plan for Table2**

<b>Total Brought Forward</b>		<b>Bidders Score</b>	<b>Cut -off Score</b>	<b>Maximum Score</b>
3.	From Table 2.(A)		10	14
4.	From Table 2.(B)		8	10
5.	From Table 2.(C)		6	7
6.	From Table 2.(D)		27	31
7.	From Table 2.(E)		9	12
8.	From Table 2.(F)		8	10
9.	From Table 2.(G)		3	5
10.	From Table 2.(H)		2	3
11.	From Table 2.(I)		2	3
12.	From Table 2.(J)		7	8
<b>Sub Total (Carried to Table 3)</b>			<b>82</b>	<b>103</b>

**The Cut-off mark under Table 2 is 82 Marks, any bidder not attaining this pass-mark will not proceed to table 3.**

**Table 3 – Overall Technical Evaluation Criteria**

<b>Item</b>		<b>Bidders Score</b>	<b>Maximum Score</b>
1.	Total Brought Forward From Table 1 (vendor Evaluation)		<b>35</b>
2.	Total Brought Forward From Table 2 (Equipment Evaluation)		<b>106</b>
<b>Sub Total</b>			<b>141</b>

**The pass-mark under the Technical Evaluation is 106Marks, any bidder not attaining this pass-mark will have their financials returned unopened**

**Only the following documents shall constitute the financial proposal**

- 1. Form of Tender (duly filled, signed and stamped)**
- 2. Priced bills of quantities**

**Overall Tender Evaluation Criteria**

<b>Criteria</b>	<b>Maximum Score</b>	<b>Cut Off Scores</b>
Tender Responsiveness	Mandatory	<b>Requirement</b>
Vendor Evaluation	35	<b>24</b>
Technical Evaluation	106	<b>82</b>
Financial Evaluation	Lowest evaluated responsive bidder	
<p><b>Post-qualification</b>                      KRA will verify and determine to its satisfaction whether the tenderer that is selected as having submitted the lowest evaluated responsive tender is qualified to perform the contract satisfactorily.</p>		

### STAGE 3: FINANCIAL EVALUATION

1.	<p><b>FINANCIAL EVALUATION CRITERIA</b></p> <p>The Authority will award the contract to the successful tenderer whose tender will have been determined to be substantially responsive and have been determined to be the lowest evaluated tender within the prevailing market rates and Arithmetic checks undertaken</p> <p><b>All technically responsive bidders will be ranked and award given to the lowest evaluated bidder</b></p>	
2.	<p><b>NO CORRECTION OF ERRORS</b></p> <p>Pursuant to Section 82 of Public Procurement and Asset Disposal Act, 2015. The Tender Sum as submitted and read out during the Tender Opening Shall be absolute and final and shall not be the subject of correction, adjustment of amendment in any way by the person or entity.</p>	
3.	<p><b>DUE DILLIGENCE</b></p> <p>After recommendation of award but prior to the award letter being issued the client will undertake confirmation / site visit to confirm that the OEM has installed a working data center infrastructure management system locally.</p>	

## **SECTION 5: CONDITIONS OF CONTRACT**

## CONDITION OF CONTRACT

### 1. Definitions

1.1 In this Contract, except where context otherwise requires, the following terms shall be interpreted as indicated;

**“Bill of Quantities”** means the priced and completed Bill of Quantities forming part of the tender.

**“Compensation Events”** are those defined in Clause 24 hereunder.

**“The Completion Date”** means the date of completion of the Works as certified by the Project Manager, in accordance with Clause 31.

**“The Contract”** means the agreement entered into between the Employer and the Contractor as recorded in the Agreement Form and signed by the parties including all attachments and appendices thereto and all documents incorporated by reference therein to execute, complete, and maintain the Works,

**“The Contractor”** refers to the person or corporate body who's tender to carry out the Works has been accepted by the Employer.

**“The Contractor's Tender”** is the completed tendering document submitted by the Contractor to the Employer.

**“The Contract Price”** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

**“Days”** are calendar days; **“Months”** are calendar months.

**“A Defect”** is any part of the Works not completed in accordance with the Contract.

**“The Defects Liability Certificate”** is the certificate issued by Project Manager upon correction of defects by the Contractor.

**“The Defects Liability Period”** is the period named in the Contract Data and calculated from the Completion Date.

**“Drawings” include** calculations and other information provided or approved by the Project Manager for the execution of the Contract.

**“Dayworks”** are Work inputs subject to payment on a time basis for labour and the associated materials and plant.

**“Employer”**, or the **“Procuring entity”** as defined in the Public Procurement Regulations (i.e. Central or Local Government administration, Universities, Public Institutions and Corporations, etc) is the party who employs the Contractor to carry out the Works.

**“Equipment”** is the Contractor’s machinery and vehicles brought temporarily to the Site for the execution of the Works.

**“The Intended Completion Date”** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order.

**“Materials”** are all supplies, including consumables, used by the Contractor for incorporation in the Works.

**“Plant”** is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function.

**“Project Manager”** is the person named in the Appendix to Conditions of Contract (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract and shall be an “Architect” or a “Quantity Surveyor” registered under the Architects and Quantity Surveyors Act Cap 525 or an “Engineer” registered under Engineers Registration Act Cap 530.

**“Site”** is the area defined as such in the Appendix to Condition of Contract.

**“Site Investigation Reports”** are those reports that may be included in the tendering documents which are factual and interpretative about the surface and subsurface conditions at the Site.

**“Specifications”** means the Specifications of the Works included in the Contract and any modification or addition made or approved by the Project Manager.

**“Start Date”** is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with the Site possession date(s).

**“A Subcontractor”** is a person or corporate body who has a Contract with the Contractor to carry out a part of the Work in the Contract, which includes Work on the Site.

**“Temporary works”** are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

**“A Variation”** is an instruction given by the Project Manager which varies the Works.

**“The Works”** are what the Contract requires the Contractor to construct, install, and turnover to the Employer, as defined in the Appendix to Conditions of Contract.

## 2. Interpretation

- 2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning in English Language unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.
- 2.2 If sectional completion is specified in the Appendix to Conditions of Contract, reference in the Conditions of Contract to the Works, the Completion Date and the Intended Completion Date apply to any section of the Works (other than references to the Intended Completion Date for the whole of the Works).
- 2.3 The following documents shall constitute the Contract documents and shall be interpreted in the following order of priority;
  1. Agreement,
  2. Letter of Acceptance,
  3. Contractor's Tender,
  4. Appendix to Conditions of Contract,
  5. Conditions of Contract,
  6. Technical Specifications as section 8 of bidding document
  7. Drawings,
  8. Bills of Quantities as section 10 of the bidding document
  9. Any other documents listed in the Appendix to Conditions of Contract as forming part of the Contract

Immediately after the execution of the Contract, the Project Manager shall furnish both the Employer and the Contractor with two copies each of all the Contract documents. Further, as and when necessary the Project Manager shall furnish the Contractor [always with a copy to the Employer] with three [3] copies of such further drawings or details or descriptive



schedules as are reasonably necessary either to explain or amplify the Contract drawings or to enable the Contractor to carry out and complete the Works in accordance with these Conditions.

### **3. Language and Law**

- 3.1 Language of the Contract and the law governing the Contract shall be English language and the Laws of Kenya respectively unless otherwise stated.

### **4. Project Manager's Decisions**

- 4.1 Except where otherwise specifically stated, the Project Manager will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

### **5. Delegation**

- 5.1 The Project Manager may delegate any of his duties and responsibilities to others after notifying the Contractor.

### **6. Communications**

16.1 Communication between parties shall be effective only when in writing. A notice shall be effective only when it is delivered.

### **7. Form of contract**

- 7.1 The successful tenderer will be appointed as a Contractor to the Employer under the terms of the Conditions of Contract
- 7.2 He will be required to enter into a Contract with the Employer indemnifying him against liabilities in respect of the Contract works.
- 7.3 The Contractor will be required to enter into a written Contract Agreement with the Employer on the latest edition of the Agreement and Conditions of Contract for Building Works (current edition) published by The Joint Building Council of Kenya
- 7.4 The Particular and General Preliminaries of the Bills of Quantities for the Main Contract where appropriate shall apply equally to the Sub-Contractor who is to examine these sections of the document and allow for all costs which he considers may arise from Should comply with these Preliminaries

## **8. Subcontracting**

- 8.1 The Contractor may subcontract with the approval of the Project Manager, but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations.

## **9. Other Contractors**

- 9.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities etc. as listed in the Appendix to Conditions of Contract and also with the Employer, as per the directions of the Project Manager. The Contractor shall also provide facilities and services for them. The Employer may modify the said List of Other Contractors etc., and shall notify the Contractor of any such modification.

## **10. Personnel**

- 10.1 The Contractor shall employ the key personnel named in the Qualification Information, to carry out the functions stated in the said Information or other personnel approved by the Project Manager. The Project Manager will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Qualification Information. If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the Work in the Contract.

## **11. Works**

- 11.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings. The Works may commence on the Start Date and shall be carried out in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them by the Intended Completion Date.

## **12. Safety and Temporary Works**

- 12.1 The Contractor shall be responsible for the design of temporary works. However before erecting the same, he shall submit his designs including specifications and drawings to the Project Manager and to any other relevant third parties for their approval. No erection of temporary works shall be done until such approvals are obtained.

12.2 The Project Manager's approval shall not alter the Contractor's responsibility for design of the Temporary works and all drawings prepared by the Contractor for the execution of the temporary or permanent Works, shall be subject to prior approval by the Project Manager before they can be used.

12.3 The Contractor shall be responsible for the safety of all activities on the Site.

### **13. Discoveries**

13.1 Anything of historical or other interest or of significant value unexpectedly discovered on Site shall be the property of the Employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.

### **14. Work Program**

14.1 Within the time stated in the Appendix to Conditions of Contract, the Contractor shall submit to the Project Manager for approval a program showing the general methods, arrangements, order, and timing for all the activities in the Works. An update of the program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining Work, including any changes to the sequence of the activities.

The Contractor shall submit to the Project Manager for approval an updated program at intervals no longer than the period stated in the Appendix to Conditions of Contract. If the Contractor does not submit an updated program within this period, the Project Manager may withhold the amount stated in the said Appendix from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue program has been submitted. The Project Manager's approval of the program shall not alter the Contractor's obligations. The Contractor may revise the program and submit it to the Project Manager again at any time. A revised program shall show the effect of Variations and Compensation Events.

### **15. Possession of Site**

15.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Appendix to Conditions of Contract, the Employer will be deemed to have delayed the start of the relevant activities, and this will be a Compensation Event.

## **16. Access to Site**

- 16.1 The Contractor shall allow the Project Manager and any other person authorized by the Project Manager, access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.

## **17. Instructions**

- 17.1 The Contractor shall carry out all instructions of the Project Manager which are in accordance with the Contract.

## **18. Extension or Acceleration of Completion Date**

- 18.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a variation is issued which makes it impossible for completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining Work, which would cause the Contractor to incur additional cost. The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager in writing for a decision upon the effect of a Compensation Event or variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay caused by such failure shall not be considered in assessing the new (extended) Completion Date.
- 18.2 No bonus for early completion of the Works shall be paid to the Contractor by the Employer.

## **19. Management Meetings**

- 19.1 A Contract management meeting shall be held monthly and attended by the Project Manager and the Contractor. Its business shall be to review the plans for the remaining Work and to deal with matters raised in accordance with the early warning procedure. The Project Manager shall record the minutes of management meetings and provide copies of the same to those attending the meeting and the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

## **20. Early Warning**

- 20.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the Work, increase the Contract Price or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
- 20.2 The Contractor shall cooperate with the Project Manager in making and considering proposals on how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the Work and in carrying out any resulting instructions of the Project Manager.

## **21. Defects**

- 21.1 The Project Manager shall inspect the Contractor's work and notify the Contractor of any defects that are found. Such inspection shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a defect and to uncover and test any Work that the Project Manager considers may have a defect. Should the defect be found, the cost of uncovering and making good shall be borne by the Contractor, However, if there is no defect found, the cost of uncovering and making good shall be treated as a variation and added to the Contract Price.
- 21.2 The Project Manager shall give notice to the Contractor of any defects before the end of the Defects Liability Period, which begins at Completion, and is defined in the Appendix to Conditions of Contract. The Defects Liability Period shall be extended for as long as defects remain to be corrected.
- 21.3 Every time notice of a defect is given; the Contractor shall correct the notified defect within the length of time specified by the Project Manager's notice. If the Contractor has not corrected a defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the defect corrected by other parties and such cost shall be treated as a variation and be deducted from the Contract Price.

## **22. Bills of Quantities**

- 22.1 The Bills of Quantities shall contain items for the construction, installation, testing and commissioning of the Work to be done by the Contractor. The Contractor will be paid for the quantity of the Work done at the rate in the Bills of Quantities for each item.

- 22.2 If the final quantity of the Work done differs from the quantity in the Bills of Quantities for the particular item by more than 25 percent and provided the change exceeds 1 percent of the Initial Contract price, the Project Manager shall adjust the rate to allow for the change.
- 22.3 If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bills of Quantities.

## **23. Variations**

- 23.1 All variations shall be included in updated programs produced by the Contractor.
- 23.2 The Contractor shall provide the Project Manager with a quotation for carrying out the variations when requested to do so. The Project Manager shall assess the quotation, which shall be given within seven days of the request or within any longer period as may be stated by the Project Manager and before the Variation is ordered.
- 23.3 If the work in the variation corresponds with an item description in the Bills of Quantities and if in the opinion of the Project Manager, the quantity of work is not above the limit stated in Clause 21.2 or the timing of its execution does not cause the cost per unit of quantity to change, the rate in the Bills of Quantities shall be used to calculate the value of the variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the variation does not correspond with items in the Bills of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of Work.
- 23.4 If the Contractor's quotation is unreasonable, the Project Manager may order the variation and make a change to the Contract price, which shall be based on the Project Manager's own forecast of the effects of the variation on the Contractor's costs.
- 23.5 If the Project Manager decides that the urgency of varying the Work would prevent a quotation being given and considered without delaying the Work, no quotation shall be given and the variation shall be treated as a Compensation Event.
- 23.6 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
- 23.7 When the Program is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.

## **24. Payment Certificates, Currency of Payments and Advance Payments**

- 24.1 The Contractor shall submit to the Project Manager monthly applications for payment giving sufficient details of the Work done and materials on Site and the amounts which the Contractor considers himself to be entitled to. The Project Manager shall check the monthly application and certify the amount to be paid to the Contractor within 14 days. The value of Work executed and payable shall be determined by the Project Manager.
- 24.2 The value of Work executed shall comprise the value of the quantities of the items in the Bills of Quantities completed, materials delivered on Site, variations and compensation events. Such materials shall become the property of the Employer once the Employer has paid the Contractor for their value. Thereafter, they shall not be removed from Site without the Project Manager's instructions except for use upon the Works.
- 24.3 Payments shall be adjusted for deductions for retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of issue of each certificate. If the Employer makes a late payment, the Contractor shall be paid simple interest on the late payment in the next payment. Interest shall be calculated on the basis of number of days delayed at a rate three percentage points above the Central Bank of Kenya's average rate for base lending prevailing as of the first day the payment becomes overdue.
- 24.4 If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest upon the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.
- 24.5 Items of the Works for which no rate or price has been entered in will not be paid for by the Employer and shall be deemed covered by other rates and prices in the Contract.
- 24.6 The Contract Price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya Shillings and foreign currency in the proportion indicated in the tender, or agreed prior to the execution of the Contract Agreement and indicated therein. The rate of exchange for the calculation of the amount of foreign currency payment shall be the rate of exchange indicated in the Appendix to Conditions of Contract. If the Contractor indicated foreign currencies for payment other than the currencies of the countries of origin of related goods and services the Employer reserves the right to pay the equivalent at the time of payment in the currencies of the countries of such goods and services. The Employer and the Project Manager shall be notified promptly by the Contractor of any changes in the expected foreign currency requirements of the

Contractor during the execution of the Works as indicated in the Schedule of Foreign Currency Requirements and the foreign and local currency portions of the balance of the Contract Price shall then be amended by agreement between Employer and the Contractor in order to reflect appropriately such changes.

24.7 In the event that an advance payment is granted, the following shall apply: -

- (a) On signature of the Contract, the Contractor shall at his request, and without furnishing proof of expenditure, be entitled to an advance of 10% (ten percent) of the original amount of the Contract. The advance shall not be subject to retention money.
- (b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or a directly liable guarantee satisfactory to the Employer in the amount of the advance payment. The guarantee shall be in the same currency as the advance.
- (c) Reimbursement of the lump sum advance shall be made by deductions from the Interim payments and where applicable from the balance owing to the Contractor. Reimbursement shall begin when the amount of the sums due under the Contract reaches 20% of the original amount of the Contract. It shall have been completed by the time 80% of this amount is reached.

The amount to be repaid by way of successive deductions shall be calculated by means of the formula:

$$R = \frac{A(x^1 - x^{11})}{80 - 20}$$

Where:

R = the amount to be reimbursed

A = the amount of the advance which has been granted

$x^1$  = the amount of proposed cumulative payments as a percentage of the original amount of the Contract. This figure will exceed 20% but not exceed 80%.



x<sup>11</sup> = the amount of the previous cumulative payments as a percentage of the original

amount of the Contract. This figure will be below 80%but not less than 20%.

(d) with each reimbursement the counterpart of the directly liable guarantee may be reduced accordingly.

## **25. Compensation Events**

25.1 The following issues shall constitute Compensation Events:

- (a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the Appendix to Conditions of Contract.
- (b) The Employer modifies the List of Other Contractors, etc., in a way that affects the Work of the Contractor under the Contract.
- (c) The Project Manager orders a delay or does not issue drawings, specifications or instructions required for execution of the Works on time.
- (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon the Work, which is then found to have no defects.
- (e) The Project Manager unreasonably does not approve a subcontract to be let.
- (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to tenderers (including the Site investigation reports), from information available publicly and from a visual inspection of the Site.
- (g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer or additional work required for safety or other reasons.
- (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor.
- (i) The effects on the Contractor of any of the Employer's risks.

(j) The Project Manager unreasonably delays issuing a Certificate of Completion.

(k) Other compensation events described in the Contract or determined by the Project Manager shall apply.

25.2 If a compensation event would cause additional cost or would prevent the Work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.

25.3 As soon as information demonstrating the effect of each compensation event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager will assume that the Contractor will react competently and promptly to the event.

25.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor not having given early warning or not having co-operated with the Project Manager.

25.5 Prices shall be adjusted for fluctuations in the cost of inputs only if provided for in the Appendix to Conditions of Contract.

25.6 The Contractor shall give written notice to the Project Manager of his intention to make a claim within thirty days after the event giving rise to the claim has first arisen. The claim shall be submitted within thirty days thereafter.

Provided always that should the event giving rise to the claim of continuing effect, the Contractor shall submit an interim claim within the said thirty days and a final claim within thirty days of the end of the event giving rise to the claim.

## 26. Price Adjustment

- 26.1 The Project Manager shall adjust the Contract Price if taxes, duties and other levies are changed between the date 30 days before the submission of tenders for the Contract and the date of Completion. The adjustment shall be the change in the amount of tax payable by the Contractor.
- 26.2 The Contract Price shall be deemed to be based on exchange rates current at the date of tender submission in calculating the cost to the Contractor of materials to be specifically imported (by express provisions in the Contract Bills of Quantities or Specifications) for permanent incorporation in the Works. Unless otherwise stated in the Contract, if at any time during the period of the Contract exchange rates shall be varied and this shall affect the cost to the Contractor of such materials, then the Project Manager shall assess the net difference in the cost of such materials. Any amount from time to time so assessed shall be added to or deducted from the Contract Price, as the case may be.
- 26.3 Unless otherwise stated in the Contract, the Contract Price shall be deemed to have been calculated in the manner set out below and in sub-clauses 25.4 and 25.5 and shall be subject to adjustment in the events specified thereunder;
- (i) The prices contained in the Contract Bills of Quantities shall be deemed to be based upon the rates of wages and other emoluments and expenses as determined by the Joint Building Council of Kenya (J.B.C.) and set out in the schedule of basic rates issued 30 days before the date for submission of tenders. A copy of the schedule used by the Contractor in his pricing shall be attached in the Appendix to Conditions of Contract.
  - (ii) Upon J.B.C. determining that any of the said rates of wages or other emoluments and expenses are increased or decreased, then the Contract Price shall be increased or decreased by the amount assessed by the Project Manager based upon the difference, expressed as a percentage, between the rate set out in the schedule of basic rates issued 30 days before the date for submission of tenders and the rate published by the J.B.C. and applied to the quantum of labor incorporated within the amount of Work remaining to be executed at the date of publication of such increase or decrease.
  - (iii) No adjustment shall be made in respect of changes in the rates of wages and other emoluments and expenses which occur after the date of Completion except during such other period as may be granted as an extension of time under clause 17.0 of these Conditions.

- 26.4 The prices contained in the Contract Bills of Quantities shall be deemed to be based upon the basic prices of materials to be permanently incorporated in the Works as determined by the J.B.C. and set out in the schedule of basic rates issued 30 days before the date for submission of tenders. A copy of the schedule used by the Contractor in his pricing shall be attached in the Appendix to Conditions of Contract.
- 26.5 Upon the J.B.C. determining that any of the said basic prices are increased or decreased then the Contract Price shall be increased or decreased by the amount to be assessed by the Project Manager based upon the difference between the price set out in the schedule of basic rates issued 30 days before the date for submission of tenders and the rate published by the J.B.C. and applied to the quantum of the relevant materials which have not been taken into account in arriving at the amount of any interim certificate under clause 23 of these Conditions issued before the date of publication of such increase or decrease.
- 26.6 No adjustment shall be made in respect of changes in basic prices of materials which occur after the date for Completion except during such other period as may be granted as an extension of time under clause 17.0 of these Conditions.
- 26.7 The provisions of sub-clause 25.1 to 25.2 herein shall not apply in respect of any materials included in the schedule of basic rates.

## **27. Retention**

- 27.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the Appendix to Conditions of Contract until Completion of the whole of the Works. On Completion of the whole of the Works, half the total amount retained shall be repaid to the Contractor and the remaining half when the Defects Liability Period has passed and the Project Manager has certified that all defects notified to the Contractor before the end of this period have been corrected.

## **28. Liquidated Damages**

- 28.1 The Contractor shall pay liquidated damages to the Employer at the rate stated in the Appendix to Conditions of Contract for each day that the actual Completion Date is later than the Intended Completion Date. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not alter the Contractor's liabilities.
- 28.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment

certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rate specified in Clause 23.30

## **29. Securities**

29.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a reputable bank acceptable to the Employer, and denominated in Kenya Shillings. The Performance Security shall be valid until a date 30 days beyond the date of issue of the Certificate of Completion.

## **30. Dayworks**

30.1 If applicable, the Dayworks rates in the Contractor's tender shall be used for small additional amounts of Work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.

30.2 All work to be paid for as Dayworks shall be recorded by the Contractor on Forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the Work being done.

30.3 The Contractor shall be paid for Dayworks subject to obtaining signed Day works forms.

## **31. Liability and Insurance**

31.1 From the Start Date until the Defects Correction Certificate has been issued, the following are the Employer's risks:

(a) The risk of personal injury, death or loss of or damage to property (excluding the Works, Plant, Materials and Equipment), which are due to;

(i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works, or

(ii) negligence, breach of statutory duty or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.

(b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in Employer's design, or due to war or radioactive contamination directly affecting the place where the Works are being executed.

- 31.2 From the Completion Date until the Defects Correction Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is the Employer's risk except loss or damage due to;
- (a) a defect which existed on or before the Completion Date.
  - (b) an event occurring before the Completion Date, which was not itself the Employer's risk
  - (c) the activities of the Contractor on the Site after the Completion Date.

- 31.3 From the Start Date until the Defects Correction Certificate has been issued, the risks of personal injury, death and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risk are Contractor's risks.

The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts stated in the Appendix to Conditions of Contract for the following events;

- (a) loss of or damage to the Works, Plant, and Materials;
- (b) loss of or damage to Equipment;
- (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract, and
- (d) personal injury or death.

- 31.4 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation required to rectify the loss or damage incurred.

- 31.5 If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

- 31.6 Alterations to the terms of an insurance shall not be made without the approval of the Project Manager. Both parties shall comply with any conditions of insurance policies.

## **32. Completion and taking over**

32.1 Upon deciding that the Works are complete, the Contractor shall issue a written request to the Project Manager to issue a Certificate of Completion of the Works. The Employer shall take over the Site and the Works within seven [7] days of the Project Manager's issuing a Certificate of Completion.

## **33. Final Account**

33.1 The Contractor shall issue the Project Manager with a detailed account of the total amount that the Contractor considers payable to him by the Employer under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 30 days a schedule that states the scope of the corrections or additions that are necessary. If the final account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a Payment Certificate. The Employer shall pay the Contractor the amount due in the Final Certificate within 60 days.

## **34. Termination**

34.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract. These fundamental breaches of Contract shall include, but shall not be limited to, the following;

- (a) The Contractor stops work for 30 days when no stoppage of work is shown on the current program and the stoppage has not been authorized by the Project Manager;
- (b) The Project Manager instructs the Contractor to delay the progress of the Works, and the instruction is not withdrawn within 30 days;
- (c) The Contractor is declared bankrupt or goes into liquidation other than for a reconstruction or amalgamation;
- (d) A payment certified by the Project Manager is not paid by the Employer to the Contractor within 30 days (for Interim Certificate) or 60 days (for Final Certificate) of issue.
- (e) The Project Manager gives notice that failure to correct a particular defect is a fundamental breach of Contract and

the Contractor fails to correct it within a reasonable period of time determined by the Project Manager;

- (f) The Contractor does not maintain a security, which is required.

34.2 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under Clause 33.1 above, the Project Manager shall decide whether the breach is fundamental or not.

34.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.

34.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible. The Project Manager shall immediately thereafter arrange for a meeting for the purpose of taking record of the Works executed and materials, goods, equipment and temporary buildings on Site.

### **35. Payment Upon Termination**

35.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the Work done and materials ordered and delivered to Site up to the date of the issue of the certificate. Additional liquidated damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable by the Contractor.

35.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the Work done, materials ordered, the reasonable cost of removal of equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works.

35.3 The Employer may employ and pay other persons to carry out and complete the Works and to rectify any defects and may enter upon the Works and use all materials on the Site, plant, equipment and temporary works.

35.4 The Contractor shall, during the execution or after the completion of the Works under this clause remove from the Site as and when required, within such reasonable time as the Project Manager may in writing specify, any temporary buildings, plant, machinery, appliances, goods or materials belonging to or hired by him, and in default the Employer may (without



being responsible for any loss or damage) remove and sell any such property of the Contractor, holding the proceeds less all costs incurred to the credit of the Contractor. Until after completion of the Works under this clause the Employer shall not be bound by any other provision of this Contract to make any payment to the Contractor, but upon such completion as aforesaid and the verification within a reasonable time of the accounts therefore the Project Manager shall certify the amount of expenses properly incurred by the Employer and, if such amount added to the money paid to the Contractor before such determination exceeds the total amount which would have been payable on due completion in accordance with this Contract the difference shall be a debt payable to the Employer by the Contractor; and if the said amount added to the said money be less than the said total amount, the difference shall be a debt payable by the Employer to the Contractor.

### **36. Release from Performance**

- 36.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop Work as quickly as possible after receiving this certificate and shall be paid for all Work carried out before receiving it.

### **37. Corrupt gifts and payments of commission**

The Contractor shall not;

- (a) Offer or give or agree to give to any person in the service of the Employer any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for the Employer or for showing or forbearing to show favor or disfavor to any person in relation to this or any other contract for the Employer.
- (b) Enter into this or any other contract with the Employer in connection with which commission has been paid or agreed to be paid by him or on his behalf or to his knowledge, unless before the Contract is made particulars of any such commission and of the terms and conditions of any agreement for the payment thereof have been disclosed in writing to the Employer.

Any breach of this Condition by the Contractor or by anyone employed by him or acting on his behalf (whether with or without the knowledge of the Contractor) shall be an offence under the provisions of the Public Procurement Regulations issued under The Exchequer and Audit Act Cap 412 of the Laws of Kenya.

### **38. Settlement of Disputes**

38.1 In case any dispute or difference shall arise between the Employer or the Project Manager on his behalf and the Contractor, either during the progress or after the completion or termination of the Works, such dispute shall be notified in writing by either party to the other with a request to submit it to arbitration and to concur in the appointment of an Arbitrator within thirty days of the notice. The dispute shall be referred to the arbitration and final decision of a person to be agreed between the parties. Failing agreement to concur in the appointment of an Arbitrator, the Arbitrator shall be appointed by the Chairman or Vice Chairman of any of the following professional institutions;

- (i) Architectural Association of Kenya
- (ii) Institute of Quantity Surveyors of Kenya
- (iii) Association of Consulting Engineers of Kenya
- (iv) Chartered Institute of Arbitrators (Kenya Branch)
- (v) Institution of Engineers of Kenya

On the request of the applying party. The institution written to first by the aggrieved party shall take precedence over all other institutions.

38.2 The arbitration may be on the construction of this Contract or on any matter or thing of whatsoever nature arising thereunder or in connection therewith, including any matter or thing left by this Contract to the discretion of the Project Manager, or the withholding by the Project Manager of any certificate to which the Contractor may claim to be entitled to or the measurement and valuation referred to in clause 23.0 of these conditions, or the rights and liabilities of the parties subsequent to the termination of Contract.

38.3 Provided that no arbitration proceedings shall be commenced on any dispute or difference where notice of a dispute or difference has not been given by the applying party within ninety days of the occurrence or discovery of the matter or issue giving rise to the dispute.

38.4 Notwithstanding the issue of a notice as stated above, the arbitration of such a dispute or difference shall not commence unless an attempt has in the first instance been made by the parties to settle such dispute or difference amicably with or without the assistance of third parties. Proof of such attempt shall be required.

- 38.5 Notwithstanding anything stated herein the following matters may be referred to arbitration before the practical completion of the Works or abandonment of the Works or termination of the Contract by either party:
- 37.5.1 The appointment of a replacement Project Manager upon the said person ceasing to act.
  - 37.5.2 Whether or not the issue of an instruction by the Project Manager is empowered by these Conditions.
  - 37.5.3 Whether or not a certificate has been improperly withheld or is not in accordance with these Conditions.
  - 37.5.4 Any dispute or difference arising in respect of war risks or war damage.
- 37.6 All other matters shall only be referred to arbitration after the completion or alleged completion of the Works or termination or alleged termination of the Contract, unless the Employer and the Contractor agree otherwise in writing.
- 37.7 The Arbitrator shall, without prejudice to the generality of his powers, have powers to direct such measurements, computations, tests or valuations as may in his opinion be desirable in order to determine the rights of the parties and assess and award any sums which ought to have been the subject of or included in any certificate.
- 37.8 The Arbitrator shall, without prejudice to the generality of his powers, have powers to open up, review and revise any certificate, opinion, decision, requirement or notice and to determine all matters in dispute which shall be submitted to him in the same manner as if no such certificate, opinion, decision requirement or notice had been given.
- 37.9 The award of such Arbitrator shall be final and binding upon the parties.

### **39. Alternative Dispute Resolution**

- 39.1 In pursuant to clause 37 of these Conditions of Contract, it shall be a condition that no dispute shall be referred to arbitration unless and until the matter has been dealt with through Alternative Dispute Resolution (ADR) mechanism
- 39.2 The person or persons to conduct the Alternative Resolution shall be agreed upon between the parties

## SECTION 6: APPENDIX TO CONDITIONS OF CONTRACT

### THE EMPLOYER IS

Name: **Kenya Revenue Authority**  
Address: **P.O. Box 48240 - 00100, GPO**  
Name of Authorized Representative: **Deputy Commissioner - Supply Chain Management**

### THE PROJECT MANAGER IS

Name: **Kenya Revenue Authority**  
Address: **P.O. Box 48240 - 00100, GPO**

The name (and identification number) of the Contract is:  
**Proposed Refurbishment of Times Tower Data Center Installations  
(KRA/HQS/NCB- 045-2020-2021)**

The Start Date shall be:  
**Agreed with the Project Manager**

The Intended Completion Date for the whole of the Works shall be:  
**Agreed with the Project Manager**

The following documents shall also form part of the Contract:  
**As listed in Clause 2.3 of the Conditions of Contract**

The Contractor shall submit a revised program for the Works within **14** days of the delivery of the Letter of Acceptance.

The Site Possession Date Shall Be: **Agreed with the Project Manager**

The Site is located at:  
**Times Tower Building, Ground, Third and Fourth Floors, Nairobi** and is defined in drawings.

The Defects Liability period is **180** days.

Other Contractor, utilities etc., to be engaged by the Employer on the Site  
Include those for the execution of:

**1. All Works**

The minimum insurance cover shall be:

**1.** The minimum cover for insurance of the Works and of Plant and Materials in respect of the

Contractor's fault design is **Contractors all risk policy**

**2.** The minimum cover for loss or damage to Equipment is **NIL**

**3.** The minimum of insurance of other property is **ksh. 1,000,000.00**

**4.** The minimum cover for personal injury or death insurance

For the Contractor's employees is **AS PER LAWS APPLICABLE**

And for other people is **AS PER LAWS APPLICABLE**

The following events shall also be Compensation Events:

**1. NONE (ONLY AS LISTED IN CLAUSE 24 OF THE CONDITIONS OF CONTRACT)**

The period between Program updates is **14** days.

The amount to be withheld for late submission of an updated Program is **WHOLE CERTIFICATE**

The proportion of payments retained is **10** percent. The limit of payments retained is **5** percent.

The Price Adjustment Clause **shall** apply.

The liquidated damages for the whole of the Works is Kshs. **500,000** per week or part thereof

The Performance Security shall be for the following minimum amounts equivalent as a percentage of the Contract Price **ten** percent (**10%**)

The Completion Period for the Works is **as agreed with the Project Manager**

Advance Payment **shall not** be granted.

The schedule of basic rates used in pricing by the Contractor is as attached  
*[Contractor to attach]*.

## **SECTION 7: DRAWINGS**

## DRAWINGS

**Note:**

Drawing list is found in the table below. Full set of drawings will only be given to successful bidder upon signing Non-Disclosure Agreement with the Client

<b>DRAWING LIST</b>	
<b>SHEET NAME</b>	<b>SHEET NUMBER</b>
<b>SPACE AND EQUIPMENT LAYOUT</b>	
a) Critical Spaces – Ground floor	KRA – CS – 01
b) Critical Spaces – Third Floor	KRA – CS – 02
c) Fourth Floor – Critical Spaces	KRA – CS – 03
d) Ground Floor Equipment Layout	KRA – EL – 04
e) Third Floor Equipment Layout	KRA – EL – 05
f) Fourth Floor Equipment Layout	KRA – EL – 06
<b>ARCHITECTURAL LAYOUTS</b>	
a) Architectural – Furniture Layout	KRA – AL – 01
b) Architectural – Floor Finish	KRA – AL – 02
<b>POWER SYSTEM</b>	
a) Main Schematic Block Diagram	KRA – PS – 01
b) Ground Floor Lighting Layout	KRA – PS – 02
c) Third Floor – Lighting Layout	KRA – PS – 03
d) Fourth Floor – Lighting Layout	KRA – PS – 04
e) Third Floor – Power Layout	KRA – PS – 05
f) Fourth Floor – Small Power	KRA – PS – 06
g) Earthing Schematic	KRA – PS – 07
<b>AIR CONDITIONING</b>	
a) Air Conditioning Schematic	MECH – AC - 01
b) Third Floor – Air Conditioning Layout	MECH – AC – 02
c) Fourth Floor – Air Conditioning Layout	MECH – AC - 03
<b>FIRE SUPPRESSION</b>	
a) Fourth Floor – Fire Suppression Layout	MECH – FS - 01
b) Fourth Floor (Raised Floor) – Fire Suppression Layout	MECH – FS – 02

c) Fourth Floor – Fire Suppression Schematics for other Rooms	MECH – FS – 03
d) Fourth Floor – Fire Suppression Schematics for white Space	MECH – FS - 04
<b>EXTRA LOW VOLTAGE</b>	
a) Access Control System	ELV – AC – 00C
b) Access Control Schematic	ELV – AC – 01
c) Ground Floor – Security Level Layout	ELV – AC – 02
d) Ground Floor – Access Control Layout	ELV – AC – 03
f) Fourth Floor – Security Level Layout	ELV – AC – 06
g) Fourth Floor – Access Control Layout	ELV – AC – 07
h) Building Management System	ELV – BMS – 00
i) Building Management System Architecture	ELV – BMS – 01
j) Ground Floor – BMS Panels Layout	ELV – BMS – 02
l) Fourth Floor – BMS Panels Layout	ELV – BMS – 04
m) CCTV Surveillance layout	ELV – CCTV – 00
n) CCTV Surveillance Schematic	ELV – CCTV – 01
o) Ground Floor – CCTV Surveillance Layout and Coverage	ELV – CCTV – 02
r) Fourth Floor – CCTV Surveillance Layout	ELV – CCTV – 05
s) Fourth Floor – CCTV Coverage Layout	ELV – CCTV – 06
t) White Space Communication Schematic	ELV – CM – 01
u) Fire Detection and Alarm System	ELV – FD – 00
v) Fire Detection and Alarm Schematic	ELV – FD – 01
w) Ground Floor – Fire Detection and Alarm Layout	ELV – FD – 02
y) Fourth Floor – Fire Alarm and Detection Layout	ELV – FD – 04
z) Video Wall System	ELV – VW – 01



## **SECTION 8: TECHNICAL SPECIFICATION**

## **carbon dioxide fire-extinguishing systems**

### **Systems**

#### **Carbon dioxide fire-extinguishing systems**

1. System performance: Cable selection
2. Source: High-pressure fire-extinguishing gas storage cylinders
3. Pipelines:
4. Pipeline ancillaries
  - 4.1. Manifold: Gas fire suppression manifolds
  - 4.2. Valves: Check and non-return valves; Container gas fire extinguishing valves
  - 4.3. Pipeline supports: Pipe clips
5. Fire stopping: Individual services penetrations fire stopping system.
6. Outlets: Carbon dioxide fire extinguishing nozzles
7. Operation: 5 Electrical actuation devices
8. Controls: Extinguishing control panels; Emergency abort devices
9. System accessories: Reference to missing clause Roof equipment supports; Gas fire suppression pressure switches
10. Plant and equipment identification: Self-adhesive colour pipe bands Type A
11. Execution: Installing carbon dioxide fire extinguishing systems
12. System completion: Testing; Setting to work; Inspection and test records; Documentation

### **System performance**

#### **Cable selection**

1. Standard: To [BS 8519](#), Category 2.

### **Products**

#### **Pipe clips**

1. Manufacturer:
2. Material: Carbon steel.
3. Execution: Installing pipeline supports

#### **Self-adhesive colour pipe bands Type A**

1. Standards: To [BS 1710](#).
2. Identification type: Adhesive colour bands.
3. Execution: Installing identification on pipework Type A

#### **High-pressure fire-extinguishing gas storage cylinders**

1. Standard: To [BS EN ISO 9809-1](#) and [BS 5306-4](#).
2. Third party certification: UL Listed or FM Approved
3. Fill capacity: As indicated in the bills of quantities
4. Colour: Manufacturer Standard
5. Execution: Installing storage tanks and cylinders

#### **Check and non-return valves**

1. Standard: To [BS EN 12094-13](#).
2. Third party certification: UL or FM Approved
3. Valve type: Non-return valve.
4. Gas: Carbon dioxide.

### **Container gas fire extinguishing valves**

1. Standard: To [BS EN 12094-4](#).
2. Third party certification: UL or FM approved
3. Gas: Carbon dioxide.
4. Material: Brass body.
5. Actuator: Electrical.

### **Gas fire suppression manifolds**

1. Third party certification: UL or FM approved
2. Gas: Carbon dioxide.
3. Inlets: Two
4. Colour: Manufacturer Standard

### **Gas fire suppression pressure switches**

1. Standard: To [BS EN 12094-10](#).
2. Third party certification: UL or FM approved
3. Gas: Inert gas.
4. Material
  - 4.1. Body: Manufacturer Standard
  - 4.2. Diaphragm: Manufacturer Standard

### **Carbon dioxide fire extinguishing nozzles**

1. Standard: To [BS EN 12094-7](#).
2. Arrangement: Tankside.
3. Execution: [Installing nozzles](#)

### **Electrical actuation devices**

1. Actuator: In accordance with [BS 7273-1](#).
2. Means of actuation: Point heat detector.

### **Emergency abort devices**

1. Standard: To [BS EN 12094-1](#).
2. Controls: Manual release switch. Time delay facility.

### **Extinguishing control panels**

1. Arrangement: One Zone
2. Components on panel fascia: Alarm silence lamp. Buzzer silence. Fire extinguishing system automatic mode – lamp. Fire extinguishing system manual mode – lamp. Hold gas release – switch and lamp. Isolate gas release circuit – switch and lamp. Isolate remote signal – switch and lamp. Key operated security switch. Lamp test switch. Manual or automatic mode – push switch. Manual release unit. Power on lamp. Test evacuate alarm switch. System general fault – lamp and buzzer. Silence alarm switch.
3. Execution:

## **Execution**

### **Installing pipeline supports**

1. Position
  - 1.1. Surface mountings: Split ring, spacer nipple and backplate.

### **Installing identification on pipework Type A**

1. Application of basic identification colour: Coloured bands as [BS 1710](#).

2. **Information:** Colour bands as [BS 1710](#).
3. **Direction of flow:** Indication arrow.

### **Installing storage tanks and cylinders**

1. **Position:** Close to the hazards they protect.
2. **Protection:** Provide guards or enclosures to protect cylinders from mechanical damage and from direct sunlight and other severe climatic exposure.

### **Installing nozzles**

1. **Position:** Free of obstructions, air currents and draughts.
2. **Orientation:** Install perpendicular to the hazard, centred over the area protected by the nozzle, or between 45° and 90° from the plane of the hazard surface.

### **Installing carbon dioxide fire extinguishing systems**

1. **Standard:** To [BS 5306-4](#).

## **System completion**

### **Testing**

1. **Standard:** Carbon dioxide fire extinguishant systems to [BS 5306-4](#).
2. **Notice (minimum):** 3 days.

### **Setting to work**

1. **Standard:** Carbon dioxide fire extinguishant systems to [BS 5306-4](#).
2. **Operation:** Using nitrogen, or a suitable alternative, test that flow through pipelines and nozzles is unobstructed.
3. **Thermal links:** Check that control cable lines are free.

### **Inspection and test records**

1. **Standard:** Carbon dioxide fire extinguishant systems to [BS 5306-4](#).
2. **Record sheets**
  - 2.1. **Submission:** On completion.

### **Documentation**

1. **Standard:** Carbon dioxide fire extinguishant systems to [BS 5306-4](#).
2. **Operating and maintenance instructions**
  - 2.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 2.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 2.3. **Format:** Paper copy.
3. **Record drawings**
  - 3.1. **Content:** Location and identification of pipework regulating, isolation and control valves.
  - 3.2. **Format:** Electronic drawing.
4. **Submittal date:** At handover.

# **Inert gas total flooding fire-extinguishing systems - ig541 Systems**

## **Inert gas total flooding fire-extinguishing systems - IG541**

1. System performance: Cable selection Type A; Design of Inert gas fire extinguishing system
2. Extinguishant type: IG 541 System
3. Source: High-pressure fire-extinguishing gas storage cylinders Type A
4. Pipelines: SCHEDULE 40 Pipes
5. Pipeline ancillaries
  - 5.1. Valves: Container gas fire extinguishing valves Type A; Check and non-return valves Type A
  - 5.2. Pipeline supports: Beam clamps
6. Fire stopping: Individual services penetrations fire stopping system.
7. Outlets: Inert gas fire extinguishing nozzles
8. Operation: Electrical actuation devices Type A; Electrical actuation devices Type B
9. Controls: Extinguishing control panels Type A; Emergency abort devices Type A; Reference to missing clause Extinguishing control panels Type B; Manual triggering devices
10. System accessories:
11. Plant and equipment identification: Self-adhesive colour pipe bands Type B
12. Execution:
13. System completion: Testing Type A; Inspection and test records Type A; Documentation Type A

## **System performance**

### **Design of Inert gas fire extinguishing system**

1. Requirement: Submit proposals, including detailed design drawings, technical information, calculations and manufacturers' literature.

### **Cable selection Type A**

1. Standard: To [BS 8519](#), Category 2.

## **Products**

### **Beam clamps**

1. Clamp type: Bolt on, suitable for threaded rod hanger.
2. Material: Carbon steel.
3. Beam thickness:

### **Self-adhesive colour pipe bands Type B**

1. Standards: To [BS 1710](#).
2. Identification type: Adhesive colour bands.
3. Execution: Installing identification on pipework Type B

### **High-pressure fire-extinguishing gas storage cylinders Type A**

1. Standard: To [BS EN 1964-3](#) and [BS 5306-4](#).
2. Third party certification: UL OR FM Approved
3. Fill capacity: As indicated in the bills of quantities
4. Colour: Manufacturer Standard
5. Execution: Installing storage tanks and cylinders Type A

### **Check and non-return valves Type A**

1. Third party certification: UL OR FM Approved
2. Valve type: Non-return valve.
3. Gas: Inert gas.

### **Container gas fire extinguishing valves Type A**

1. Third party certification: UL or FM approved
2. Gas: Inert gas.
3. Material: Brass body.
4. Actuator: Electrical.
5. Pressure relief device: Included

### **Inert gas fire extinguishing nozzles**

1. Arrangement: Overhead.
2. Execution: [Installing nozzles Type A](#)

### **Electrical actuation devices Type A**

1. Actuator: In accordance with [BS 7273-1](#).
2. Means of actuation: Optical beam smoke detector.

### **Electrical actuation devices Type B**

1. Actuator: In accordance with [BS 7273-1](#).
2. Means of actuation: Optical beam smoke detector.

### **Emergency abort devices Type A**

1. Standard: To [BS EN 12094-1](#).
2. Controls: Abort switch. Time delay facility. Manual release switch.

### **Extinguishing control panels Type A**

1. Arrangement: Four zone.
2. Components on panel fascia: Alarm silence lamp. Buzzer silence. Fire extinguishing system automatic mode – lamp. Fire extinguishing system manual mode – lamp. Hold gas release – switch and lamp. Isolate gas release circuit – switch and lamp. Isolate remote signal – switch and lamp. Key operated security switch. Lamp test switch. Manual or automatic mode – push switch. Manual release unit. Power on lamp.
3. Execution:

### **Manual triggering devices**

1. Standard: To [BS EN 12094-3](#).

## **Execution**

### **Installing identification on pipework Type B**

1. Application of basic identification colour: Coloured bands as [BS 1710](#).
2. Information: Colour bands as [BS 1710](#).
3. Direction of flow: Indication arrow.

### **Installing storage tanks and cylinders Type A**

1. Position: Close to the hazards they protect.
2. Protection: Provide guards or enclosures to protect cylinders from mechanical damage and from direct sunlight and other severe climatic exposure.

### **Installing nozzles Type A**

1. Position: Free of obstructions, air currents and draughts.

2. **Orientation:** Install perpendicular to the hazard, centred over the area protected by the nozzle, or between 45° and 90° from the plane of the hazard surface.

## **System completion**

### **Testing Type A**

1. **Standard:** Inert gas fire extinguishant systems to [BS EN 15004-1](#).
2. **Notice (minimum):** 3 days.

### **Inspection and test records Type A**

1. **Standard:** Inert gas fire extinguishant systems to [BS EN 15004-1](#).
2. **Record sheets**
  - 2.1. **Submission:** On completion.
  - 2.2. **Number of copies:** Three.

### **Documentation Type A**

1. **Standard:** Inert gas fire extinguishant systems to [BS EN 15004-1](#).
2. **Operating and maintenance instructions**
  - 2.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 2.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 2.3. **Format:** Paper copy.
  - 2.4. **Number of copies:** Two.
3. **Record drawings**
  - 3.1. **Content:** Location and arrangement of plant in plant rooms. Location, size and route of mechanical services. Location and identification of pipework regulating, isolation and control valves. Location of outlets.
  - 3.2. **Format:** Electronic drawing.
  - 3.3. **Number of copies:** Two.
4. **Submittal date:** At handover.

## **Fuel oil supply systems**

### **Systems**

#### **Fuel oil supply systems**

1. Description:
2. System performance: [Design of fuel oil supply systems](#)
3. Supply arrangement: Pumped supply.
4. Class of oil: D to [BS 2869](#).
5. Storage type: Above ground tanks
6. Storage tanks
  - 6.1. Tank type: [Carbon steel oil tanks](#)
  - 6.2. Tank accessories:
7. Secondary containment: [Liquid fuel tank drip trays](#)
8. Supply pipelines: [Stainless steel pipelines](#)
9. Vent pipes: Steel
10. Oil pump: [Fuel oil transfer pumps](#)
11. Outlets: Generator set.
12. Plant and equipment identification: [Self-adhesive colour pipe bands](#)
13. Execution: [Installing oil supply systems](#)
14. System completion: [Commissioning and performance testing](#); [Demonstrations](#); [Documentation](#)

### **System performance**

#### **Design of fuel oil supply systems**

1. Design: Complete the design of the fuel oil supply system.
2. Standards: In accordance with [BS 5410-3](#).
3. Location of tank: Above ground.
4. Leak detection: Class IV A to [BS EN 13160-5](#).
5. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

### **Products**

#### **Self-adhesive colour pipe bands**

1. Standards: To [BS 1710](#).
2. Identification type: Adhesive colour bands.
3. Execution: [Installing identification on pipework](#)

#### **Liquid fuel tank drip trays**

1. Arrangement: Removable.
2. Capacity: 1000 Liters

#### **Carbon steel oil tanks**

1. Storage tanks
  - 1.1. Standards: To [BS EN 12285-2](#) and [OFTEC OFS T200](#).
  - 1.2. Arrangement: Integrally bundled, double skin, suitable for above-ground use.
  - 1.3. Type: Type A.
2. Integral bund



- 2.1. Standard: To [OFTEC OFS T200](#).
- 2.2. Type: Totally enclosed.
- 2.3. Bund cover: Removable.
3. Tank capacity: 5000 Liters
4. Tank design pressure: Manufacturer Standard
5. Number of manholes or inspection covers: One
6. Fittings: Drain valve. Fill pipe. Isolating valves. Vent pipe.
7. Accessories: Extended fill pipe. Overfill alarms.
8. Execution: [Installing tanks](#); [Installing tanks Type A](#)

### **Stainless steel pipelines**

1. General requirements: [Stainless steel pipeline fittings](#)
2. Standards: To [BS EN 10357](#).
3. Finish: Polished.
4. Execution: [Installing stainless steel pipelines](#)

### **Stainless steel pipeline fittings**

1. Standards
  - 1.1. Capillary: To [BS 4825-2](#).
  - 1.2. Clamp type couplings: To [BS 4825-3](#).
  - 1.3. Compression: To [BS EN 1254-2](#).
  - 1.4. Press fittings:
  - 1.5. Recessed ring joint type (RJT) couplings: To [BS 4825-5](#).
  - 1.6. Threaded (IDF type) couplings: To [BS 4825-4](#).

### **Fuel oil transfer pumps**

1. Duties
  - 1.1. Operation: Duty/standby.
  - 1.2. Flow rate: 80L/min
  - 1.3. Resistance: 2 Bar
  - 1.4. Motor
    - 1.4.1. Nominal voltage: Single phase 230 V a.c.
    - 1.4.2. Frequency: 50 Hz.
2. Connections: Threaded.
3. Accessories: Anti-vibration mountings. Flexible connections. Auto-changeover starter panel. Single filters.
4. Execution: [Installing fuel transfer pumps](#)

## **Execution**

### **Installing identification on pipework**

1. Application of basic identification colour: Coloured bands as [BS 1710](#).
2. Safety colour identification: On or next to the colour bands
3. Information: Colour bands as [BS 1710](#).
4. Direction of flow: Indication arrow and the word FLOW or the letter F. Indication arrow and the word RETURN or the letter R.

### **Installing tanks**

1. Standards: To [BS EN 12285-2](#).

2. **Above-ground steel tanks:** Support on plinths built on concrete foundations. Run plinths across the shortest base dimension of the tanks. Plinth width to be slightly wider than the tank.
3. **Fall:** Arrange horizontal tanks to slope slightly to drain off valve end.

### **Installing tanks Type A**

1. Standards:
2. Above-ground steel tanks:
3. Above-ground plastics tanks:
4. Fall:

### **Pipelines installation generally**

1. Standard:
2. Dissimilar metals: Prevent electrolytic corrosion.

### **Installing stainless steel pipelines**

1. General requirements: [Pipelines installation generally](#)
2. Jointing method: Press fit.

### **Installing fuel transfer pumps**

1. **Isolation:** Provide a valve in the pump feed line to prevent tank contents from leaking.
2. **Protection:** Protect fuel transfer pump from damage by impact.
3. **Security:** Provide a means of locking the pump to prevent theft of fuel.

### **Installing oil supply systems**

1. **Installation:** In accordance with [BS 5410-3](#).
2. **Fuel supply pipelines:** All fittings to be accessible. All taps and valves to be within the bund. All taps and valves to be locked shut when not in use. Provide isolation to pipework and tanks for inspection and maintenance. Properly support above-ground pipework.
3. **Vent pipes:** Terminate 4 m above ground level.

## **System completion**

### **Documentation**

1. **Operating and maintenance instructions**
  - 1.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 1.3. **Format:** Electronic copy.
2. **Record drawings**
  - 2.1. **Content:** Location and arrangement of plant in plant rooms. Location, size and route of mechanical services. Location, size, route and depth of underground services. Location, size, route and depth of underground services. Location of outlets. Location and identification of pipework regulating, isolation and control valves.
  - 2.2. **Format:** Electronic drawing.
3. **Commissioning certificates**
  - 3.1. **Format:** Electronic copy.
4. **Submittal date:** At handover.

## **Commissioning and performance testing**

1. **Commissioning:** In accordance with [OFTEC Technical Book 2](#) and [OFTEC Technical Book 5](#).
2. **General:** Demonstrate the performance of the installations.
3. **Guaranteed efficiency:** Tolerances defined in this specification.
4. **Environmental tests:** Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
5. **Results:** Include within commissioning certificates and O&M manuals.

## **Demonstrations**

1. **Running of plant**
  - 1.1. **Operation:** Run, maintain and supervise the installations under normal working conditions.
  - 1.2. **Duration:** One week.
2. **Instruction:** Instruct and demonstrate the purpose, function and operation of the installations.

## **Variable refrigerant flow systems**

### **Systems**

#### **Variable refrigerant flow systems**

1. System performance: [Design of variable refrigerant flow systems](#)
2. Compressor: [Electric-driven refrigerant compressors](#)
3. System: [Two pipe cooling only](#).
4. Pipelines: [Copper refrigerant pipelines](#)
5. Thermal insulation: [Nitrile rubber insulation](#)
6. Outlets: [Variable refrigerant flow units](#)
7. Plant and equipment identification: [Engraved mechanical plant and equipment identification labels](#)
8. Execution: [Installing variable refrigerant flow systems generally](#)
9. System completion: [Commissioning of refrigerating systems](#); [Performance testing](#); [Inspection and test records](#); [Demonstrations](#); [Documentation](#)

### **System performance**

#### **Design of variable refrigerant flow systems**

1. Design: Complete the design of the variable refrigerant flow system.
2. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

### **Products**

#### **Engraved mechanical plant and equipment identification labels**

1. Material: [Screen printed plastic](#).
2. Colour
  - 2.1. Background:
  - 2.2. Lettering: [Black](#).
3. Information to be included: [Equipment reference number](#).
4. Execution: [Installing mechanical plant and equipment identification](#)

#### **Electric-driven refrigerant compressors**

1. Standards: To [BS EN 378-1](#), [BS EN 378-2](#), [BS EN 14511-1](#), [BS EN 14511-2](#), [BS EN 14511-3](#), [BS EN 14511-4](#) and [BS EN 60335-2-40](#).
2. Output cooling: [As indicated in bills of quantities](#)
3. Maximum lift: [As indicated in bills of quantities](#)
4. Maximum drop: [As indicated in bills of quantities](#)
5. Electrical supply type: [Three phase](#).
6. Compressor: [Twin scroll](#).
7. Compressor fan type: [Axial](#).
8. Drive: [Inverter](#).
9. Refrigerant: [R410A](#).
10. Accessories: [Discharge temperature sensors](#). [High pressure sensors](#). [High pressure switch](#). [Internal compressor crankcase heater](#). [Internal overload relay](#). [Low pressure switch](#). [Overcurrent relay](#). [Overcurrent sensor](#). [Reverse phase protection](#). [Suction temperature sensors](#).

#### **Copper refrigerant pipelines**

1. Standard: To [BS EN 378-2](#).

2. Pipelines: To [BS EN 12735-1](#).
3. Execution: Installing refrigerant pipework

### **Variable refrigerant flow units**

1. Standards: To [BS EN 378-1](#) and [BS EN 378-2](#).
2. Arrangement: As indicated in bills of quantities
3. Output cooling: As indicated in bills of quantities
4. Accessories: Infrared remote control.

### **Nitrile rubber insulation**

1. Standard: To [BS EN 60684-3-151](#).
2. Form: Duct wrap. Pipe section.
3. Recycled content: 98% (minimum) to [BS EN ISO 14021](#).
4. Thermal conductivity: 0.035 W/m·K at 0°C.
5. Finish: Aluminium.
6. Insulation thickness (minimum): To [BS 5422](#).
7. Vapour barrier
  - 7.1. Vapour permeability: To [BS 5422](#), clause 5.6.
8. Protection: Self-adhesive insulation casing
9. Accessories: Valve and flange insulation
10. Items to be insulated:
11. Execution: Installing nitrile rubber insulation on pipelines

### **Self-adhesive insulation casing**

1. Material: Self adhesive cladding and jacketing.
2. Colour: Self finish.
3. Execution: Installing self-adhesive cladding and jacketing

### **Valve and flange insulation**

1. Form: Removable and reusable pads.
2. Finish: Aluminium foil faced.
3. Execution: Installing at valves and flanges

## **Execution**

### **Installing mechanical plant and equipment identification**

1. Fixing: Adhesive.
2. Position: On equipment.

### **Pipelines installation generally Type A**

1. Standard:
2. Dissimilar metals: Prevent electrolytic corrosion.

### **Installing refrigerant pipework**

1. General requirements: Pipelines installation generally Type A
2. Standards: To [BS EN 378-3](#) and [BS EN 378-4](#).

### **Installing insulation and protection products generally**

1. Standard: In accordance with [BS 5970](#).
2. Timing: Insulate after installed system has been fully tested and joints proved sound.
3. Insulation: Do not enclose adjacent units together.

4. **Clearance:** Maintain between pipes.
5. **Finish:** Neatly finish joints, corners, edges and overlaps.

### **Installing nitrile rubber insulation on pipelines**

1. **General requirements:** [Installing insulation and protection products generally](#)
2. **Joints:** Close butt, secure with adhesive.
3. **At fittings:** Fabricate from mitre cut pieces. Secure with adhesive.

### **Installing self adhesive cladding and jacketing**

1. **Application:** Cover insulation with self adhesive cladding and jacketing with 50 mm overlaps.

### **Installing at valves and flanges**

1. **Application:** Do not obstruct removal of nuts and bolts, or operation of valves.

### **Installing variable refrigerant flow systems generally**

1. **Standards:** To [BS EN 378-3](#) and [BS EN 378-4](#).
2. **Fixing of equipment, components and accessories:** Fix securely on purpose-made bases or supports.
3. **External units:** Protect from high winds. Prevent snow, leaves and debris from blocking air flow.
4. **Access:** Provide for inspection and servicing of heat pumps and ancillary equipment.
5. **Refrigerant lines:** Short and straight.
6. **Location of outdoor units:** Away from windows and adjacent buildings.

## **System completion**

### **Commissioning of refrigerating systems**

1. **Pre-commissioning:** In accordance with CIBSE [Commissioning Code R](#).
2. **Commissioning:** In accordance with CIBSE [Commissioning Code R](#).
3. **Notice (minimum):** 1 week.

### **Performance testing**

1. **General:** Demonstrate the performance of the installations.
2. **Guaranteed efficiency:** Tolerances defined in this specification.
3. **Environmental tests:** Carry out environmental testing. If necessary, use artificial loads to simulate operating conditions.
4. **Recorders**
  - 4.1. **Type:** Supply and maintain portable seven-day space temperature and relative humidity recorders, complete with charts.
  - 4.2. **Number:** Two.
  - 4.3. **Duration of loan:** 1 week.
5. **Reports:** Submit on completion.

### **Inspection and test records**

1. **Construction phase reports:** System design is commissionable.
2. **Records for air systems:** In accordance with BSRIA [BG 49/2015](#).
3. **Record sheets**
  - 3.1. **Submission:** On completion.
  - 3.2. **Number of copies:** Three.

## **Demonstrations**

1. Running of plant
  - 1.1. **Operation:** Run, maintain and supervise the installations under normal working conditions.
  - 1.2. **Duration:** 1 week.
2. **Instruction:** Instruct and demonstrate the purpose, function and operation of the installations.

## **Documentation**

1. Operating and maintenance instructions
  - 1.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 1.3. **Format:** Paper copy.
  - 1.4. **Number of copies:** Two.
2. Record drawings
  - 2.1. **Contents:** Location and identification of pipework regulating, isolation and control valves.
  - 2.2. **Format:** Electronic drawing.
  - 2.3. **Number of copies:** Two.
3. **Submittal date:** At handover.

## **Earthing and bonding systems**

### **Systems**

#### **Earthing and bonding systems**

1. Main incoming earth: Separate earth electrode network.
2. Main earth electrode type: Earth plates
3. Main protective bonding conductors: PVC-insulated single core non-sheathed cables; Copper earth tapes
4. Supplementary bonding conductors: PVC-insulated single core non-sheathed cables Type A
5. Circuit protective conductors: Cable armour and auxiliary.
6. Earth terminal type: Earth bars
7. Accessories: Earthing clamps; Soil conditioning conductive agents
8. Electrical identification: Equipment labels and warning notices Type B
9. Execution: Removing earthing and bonding systems; General installation; Installing earth conductor joints and connections; Installing surface barriers around earth rods; Installing earthing conductor; Installing main protective bonding conductors; Installing supplementary bonding conductors; Notices and labels; Installing functional earthing conductors
10. System completion: Inspection and testing; Documentation

### **Products**

#### **Equipment labels and warning notices Type B**

1. Material: Face engraved rigid plastic laminate.
2. Label size: As per manufacturer standard
3. Colour
  - 3.1. Background: White.
  - 3.2. Lettering: Black.
4. Typography

#### **Copper earth tapes**

1. Standards: To [BS EN 13601](#).
2. Finish: Bare.
3. Size: 25 x 6 mm.
4. Cover: Green/ yellow PVC.
5. Execution: [Installing earth conductor tapes](#)

#### **Earth bars**

1. Material
  - 1.1. Bar type: Hard drawn copper to [BS EN 13601](#).
  - 1.2. Finish: Bare.
  - 1.3. Support: PVC-U.
2. Size
  - 2.1. Profile: 50 x 6 mm.
  - 2.2. Length: 400 mm.
3. Predrilled connections (minimum): 8.
4. Disconnecting links: Two.



5. Execution: Installing earth bars

### **Earth plates**

1. Standards: To [BS EN IEC 62561-2](#).
2. Material: Lattice copper to [BS EN 13601](#).
3. Size: 600 x 600 x 3 mm.
4. Execution: Installing earth plates and mats

### **Earthing clamps**

1. Standard: To [BS 951](#).
2. Material: Metallic non-corrosive.
3. Pipe diameter (minimum): 30 mm.
4. Cable capacity (minimum): 1 x 10 mm<sup>2</sup> conductor.

### **Soil conditioning conductive agents**

1. Standard: To [BS EN IEC 62561-7](#)
2. Material: Bentonite.
3. Format: Native aggregate.
4. Execution: Installing soil conditioning agents

### **PVC-insulated single core non-sheathed cables**

1. Standards: To [BS EN 50525-1](#) and [BS EN 50525-2-31](#).
2. Cable type: H07V-K.
3. Size:
4. Reaction to fire class
  - 4.1. Fire behaviour: C<sub>ca</sub>.
  - 4.2. Additional classification for smoke production: s1.
  - 4.3. Additional classification for flaming droplets and/ or particles:
  - 4.4. Additional classification for acidity: a2.
5. Execution: Installing low-voltage cables Type F; Installing low-voltage cables in conduit and trunking Type C

### **PVC-insulated single core non-sheathed cables Type A**

1. Standards: To [BS EN 50525-1](#) and [BS EN 50525-2-31](#).
2. Cable type: H07V-K.
3. Reaction to fire class
  - 3.1. Fire behaviour: C<sub>ca</sub>.
  - 3.2. Additional classification for smoke production:
  - 3.3. Additional classification for flaming droplets and/ or particles: d1.
  - 3.4. Additional classification for acidity: a2.

## **Execution**

### **Installing earth bars**

1. Standards: In accordance with [BS 7671](#) and [BS 7430](#).
2. Main earth bar location: Next to the incoming electricity point of supply.
3. Multiple earth bars: Connect with a conductor ring.
4. Mounting
  - 4.1. Orientation: Horizontal.

- 4.2. Spacers: Ceramic.
- 4.3. Support spacing (maximum): 300 mm for 25 mm bar, and 450 mm for 50 mm bar.
- 4.4. Clearance between wall and earth bar (minimum): 30 mm.

### **Installing earth plates and mats**

1. Standards: In accordance with [BS 7671](#) and [BS 7430](#).
2. Position: As shown on the drawings
3. Arrangement: Install horizontally. Backfill immediately following installation.
4. Depth of plate top (minimum): 1000 mm below finished ground level.
5. Separation distances: Minimum of two metres between adjacent mats.

### **Installing earth conductor tapes**

1. Position: Concealed within wall construction.
2. Number of joints: Minimize.
3. Contact surfaces: Clean. Coat with corrosion inhibitor.
4. Bimetallic joints: Do not cross-contaminate.
5. Conductors passing through roofs: Provide puddle flanges.
6. Fasteners: Spaced at a maximum of 600 mm apart.

### **Installing soil conditioning agents**

1. Position: As drawing

### **Installing low-voltage cables Type F**

1. Standard: In accordance with [BS 7671](#).
2. Timing: Do not start internal cabling until building enclosure provides permanently dry conditions.
3. Preparation: Store cables above 5°C for 24 hours before installation.

Clear cable path of debris.

4. Installation temperature (minimum): 5°C.
5. Cables: Install in one length. Dress cables flat, free from twists, kinks and strain.
6. Cable pulling: Do not overstress. Prevent kinks and twisting of the cable.
7. Cable protection: Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
8. Concealed cable runs to wall accessories: Run vertically from the accessory.
9. Distance from other services running parallel (minimum): 150 mm. Position cables below heating pipes.
10. Jointing and termination
  - 10.1. Final circuit cables: At electrical accessories only.
  - 10.2. Core connections: Using compression lugs to equipment without integral clamping terminals.
  - 10.3. Terminating cables when not using glands: Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### **Installing low-voltage cables in conduit and trunking Type C**

1. Cable installation: Orderly and capable of being withdrawn.
2. Single core wiring: Arrange using the loop-in method.

3. **Cables within trunking:** Tie at 2 m intervals for cables of the same circuit reference. Label ties with circuit reference number at 10 m intervals.
4. **Cables in vertical conduit:** Provide cable clamps in accessible conduit boxes at 5 m intervals.
5. **Extra-low-voltage cables:** Install within a separate partition from low-voltage cables where installed in multi compartment trunking.

### **Removing earthing and bonding systems**

1. **Scope:** Complete installation.

### **General installation**

1. **Standards:** In accordance with [BS 7430](#) and [BS 7671](#).

### **Installing earth conductor joints and connections**

1. **Number of joints:** Minimize.
2. **Contact surfaces:** Clean. Coat with corrosion inhibitor.
3. **Bimetallic joints:** Do not cross-contaminate.
4. **Protection to joints and connections:** Apply heat shrink clear sheathing.
5. **Connections to test points:** Clamp.
6. **Copper tape jointing**
  - 6.1. **Type:** Cold pressure weld.
  - 6.2. **Copper tape overlap (minimum):** 100 mm.
7. **Protective cable terminations:** Compression lugs with phosphor bronze nuts, bolts and washers.

### **Installing surface barriers around earth rods**

1. **Non-conducting barriers:** Install to prevent personnel or livestock contact with the ground within 2 m of earth rods.
2. **Location and design:** Install to prevent personnel or livestock contact with the ground within 2 m of earth rods.

### **Installing earthing conductor**

1. **Conductor location:** Install between the main incoming earth and the main earthing terminal in one continuous length.
2. **Connection:** Make with compression lugs and phosphor bronze nuts and bolts and spring washers.
3. **Connection to earth electrodes:** Heavy duty copper alloy mechanical clamps.
4. **Protection to earthing conductor:** Rigid conduit.

### **Installing main protective bonding conductors**

1. **Separate and continuous connections:** Install between each service and the main earth terminal.
2. **Bonding connections at main earth terminal:** Connect with compression lugs and phosphor bronze nuts and bolts and spring washers.

### **Installing supplementary bonding conductors**

1. **Earth connections:** Connect with compression lugs.

### **Notices and labels**

1. **Earth bars:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.
2. **Earthing and main protective bonding connections:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.

3. **Supplementary bonding connections:** Describe each connection and label with 'SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE'.
4. **Telecommunications functional earth connections:** Label with 'TELECOMMS EARTH – DO NOT REMOVE'.
5. **Earth free locations:** For areas utilizing protection by earth-free local equipotential bonding label with 'THE PROTECTIVE BONDING CONDUCTORS ASSOCIATED WITH THE ELECTRICAL INSTALLATION IN THIS LOCATION MUST NOT BE CONNECTED TO EARTH – EQUIPMENT HAVING EXPOSED-CONDUCTIVE-PARTS CONNECTED TO EARTH MUST NOT BE BROUGHT INTO THIS LOCATION'.

### **Installing functional earthing conductors**

1. **Standards:** To [BS 6701](#) and in accordance with [BS 7671](#).
2. **Labelling:** Cable sheath continuously marked with the words 'TELECOMS FUNCTIONAL EARTH' with a label at the CMET connection stating 'TELECOMMS EARTH – DO NOT REMOVE'.

## **System completion**

### **Inspection and testing**

1. **Standards:** In accordance with [BS 7430](#) and [BS 7671](#).
2. **Notice before commencing tests (minimum):** 24 h.
3. **Continuity of protective conductors**
  - 3.1. **Parallel earth paths:** Isolate before testing.
  - 3.2. **Equipment:** Continuity tester with short circuit current not less than 200 mA, and a no load d.c. or a.c. voltage between 4 V and 24 V.
4. **External earth fault loop impedance ( $Z_e$ ):** Direct measurement.
5. **Earth fault loop impedance ( $Z_s$ ):** Calculate from measurement of the sum of the resistance of the line conductor and the resistance of the circuit protective conductor and addition to external earth loop impedance ( $Z_e$ ).

### **Documentation**

1. **Operating and maintenance instructions**
  - 1.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 1.3. **Format:** Electronic.
  - 1.4. **Number of copies:** Two.
2. **Record drawings**
  - 2.1. **Content:** Location, size and route of earth electrodes.
  - 2.2. **Format:** Electronic drawing.
  - 2.3. **Number of copies:** Two.
3. **Submittal date:** At handover.

## **Low-voltage distribution systems**

### **Systems**

#### **Low-voltage distribution systems**

1. System performance: Design of low-voltage distribution systems; Conduit, trunking and ducting generally; Grading study; Input power supply characteristics; Service conditions for low-voltage switchgear and controlgear assemblies; Service conditions and special performance requirements for uninterruptible power supply (UPS) equipment; Performance of power factor correction equipment
2. Connection to low-voltage supply: At meter operator meter terminals
3. Switchgear: Cubicle switchboards; Distribution boards
4. Protective devices : Miniature circuit breakers
5. Distribution circuit cabling: Single-core non-sheathed (LHSF) insulated cables; Multicore screened thermosetting-insulated (LSHF) sheathed cables
6. Cable accessories: Cable ties; Warning marker tapes
7. Containment: Cable ladders; Cable trunking
8. Containment accessories: Conduit fittings
9. Rewireable installation: Required.
10. Concealed installation: Required.
11. Monitoring and metering: Digital multifunction metering equipment; Current transformers
12. Power conditioning equipment: Uninterruptible power supply (UPS) units; Hybrid electrical filters
13. Accessories: Battery shelving racks; Automatic transfer switching equipment (TSE)
14. Electrical identification: Electrical diagrams; Electrical shock treatment signs; Equipment labels and warning notices
15. Execution: Factory inspections; Installing low-voltage distribution systems; Thermal video imaging surveys of low-voltage distribution systems; Connection to the incoming supply
16. System completion: Inspecting, testing and commissioning of switchgear generally; Inspecting, testing and commissioning harmonic filters; Inspecting, testing and commissioning UPS equipment; Documentation

### **System performance**

#### **Design of low-voltage distribution systems**

1. Design: Complete the design of the low-voltage distribution system.
2. Standard: In accordance with [BS 7671](#).
3. Provision of low-voltage distribution: Provide electrical supplies to equipment requiring power.
4. Spare capacity throughout the low-voltage distribution system: 20% of current carrying capacity.
5. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

#### **Conduit, trunking and ducting generally**

1. Standard: In accordance with [BS 7671](#).
2. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
3. Conduit, trunking and ducting sizes not stated: Submit.

#### **Grading study**

1. Scope: Complete for the low-voltage distribution system (including existing, if any).

2. **Fault calculations:** Include fault impedance and short circuit fault current analysis.
3. **Protective devices :** Coordinate the selection and adjustment of protective device settings to achieve discrimination throughout the fault level range. Grade so that a fault on any outgoing branch circuit is cleared by the switching device installed in the faulted branch circuit without affecting the other outgoing branch circuits. Demonstrate discrimination using time-current coordination curves with single line diagrams, in the study report.
4. **Manufacturers' details and recommended settings:** Include in study report.
5. **Study report**
  - 5.1. **Format:** Include fault impedance and short circuit fault current analysis.

### **Input power supply characteristics**

1. **Supply impedance:** 0.35 ohms.
2. **Earthing type:** TN-C-S.
3. **Nominal voltage:** Three-phase 400 V a.c.  $\pm 10\%$ .
4. **Nominal frequency:** 50 Hz.
5. **Type of protective device in the input supply circuit:** MCCB to [BS EN 60947-2](#).

### **Service conditions for low-voltage switchgear and controlgear assemblies**

1. **Service conditions**
  - 1.1. **Ambient air temperature**
    - 1.1.1. **Indoor locations:** 25 degrees celsius
    - 1.1.2. **Outdoor locations:** 35 degrees celsius
  - 1.2. **Relative humidity**
    - 1.2.1. **Indoor locations:** 50%
    - 1.2.2. **Outdoor locations:** 50%
  - 1.3. **Pollution degree category:** 2.
  - 1.4. **EMC environment:** A.
  - 1.5. **Altitude :** 1700 Meters

### **Service conditions and special performance requirements for uninterruptible power supply (UPS) equipment**

1. **Should comply with specified performance:** Submit fully dimensioned and detailed general arrangement drawings including weight of each UPS unit, total weight of complete UPS assembly (with batteries if integrated), weight of separate battery (including enclosure or racks), rating and connection plate details, enclosure base details, and arrangement and connection drawings for ancillary equipment.
2. **Mean time between failures:** Submit details.
3. **Service conditions**
  - 3.1. **Ambient service temperature for UPS equipment**
    - 3.1.1. **Minimum:** 15 degrees celsius
    - 3.1.2. **Maximum:** 30 degrees celsius
  - 3.2. **Ambient relative humidity for UPS controls:** 50%
  - 3.3. **Ambient relative humidity for batteries:** 20%-80%.
  - 3.4. **Environmental conditions:** Normal indoor.
  - 3.5. **Altitude:** 1700M
  - 3.6. **Area of use:** Restricted access area.

## **Performance of power factor correction equipment**

1. Power factor when corrected: 0.95 lagging.
2. Capacitor bank size and number of stages: Submit proposals.
3. Power factor equipment sizing calculations: Submit.

## **Products**

### **Electrical diagrams**

1. Material: Engraved plastics laminate.
2. Format: Single line engineering drawings to [BS EN 61082-1](#).
3. Information to be included: Supply characteristics. Maximum demand. Cable types and sizes. Switchgear ratings. Protective device types, ratings and function. Prospective fault current values at each item of switchgear. Earth fault loop impedance values at each item of switchgear. Circuits containing equipment vulnerable to testing.
4. Size: A1.

### **Electrical shock treatment signs**

1. Format: Plastics encapsulated.
2. Content: Text and images.
3. Geometric shape: Rectangular vertically.
4. Colours: Full colour.

### **Equipment labels and warning notices**

1. Material: Face engraved rigid plastic laminate.
2. Label size: As per bills of quantities
3. Colour
  - 3.1. Background: as directed by Engineer
  - 3.2. Lettering: as directed by Engineer
4. Typography

### **Warning marker tapes**

1. Standard: To [BS EN 12613](#), Type 1.
2. Material: Polyethylene.
3. Wire detection aid: Required.
4. Size
  - 4.1. Length: As indicated in the bills of quantities
5. Jointing method: Peg.

### **Cubicle switchboards**

1. Standards: To [BS EN 61439-1](#) and [BS EN 61439-2](#).
2. External design type: Cubicle. Multi-cubicle.
3. Rated operational voltage (Ue): 415 V a.c..
4. Incoming device: Moulded case circuit breakers.
5. Outgoing devices
  - 5.1. Type: As circuit schedules.
  - 5.2. Quantity: As in the bills of quantities
6. Busbar and connections
  - 6.1. Rated operational current (Ie): As indicated in the bills of quantities
  - 6.2. Rated short-time withstand current (Icw) for 1 s: As indicated in the bills of quantities

7. Terminals: Suitable for the connection of copper conductors.
8. Full length internal copper earth bar: As indicated in the bills of quantities
9. Spare ways: As indicated in the bills of quantities
10. Enclosure
  - 10.1. Dimensions: As indicated in the bills of quantities
  - 10.2. Ingress protection (minimum): To [BS EN 60529](#), IP44.
  - 10.3. Impact protection (minimum): To [BS EN 62262](#), IK10.
  - 10.4. Material: Steel.
  - 10.5. Finish: Externally polyester powder-coated.  
  
Internal partitions, zinc-coated.
  - 10.6. Colour: As indicated in the bills of quantities
  - 10.7. Locking mechanism: Door-interlocked operating handles.
  - 10.8. Hardware: Corrosion-resistant lever type handles with latching mechanism.
  - 10.9. Locks: Cylinder type with a standardized key.
  - 10.10. Fixing of removable panels: Captive, corrosion-resistant knurled thumb screws.
11. Internal separation: As indicated in the bills of quantities
12. Cable entry: As indicated in the bills of quantities
13. Mounting arrangement for Electricity Distributor's metering equipment: Integral within cubicle switchboard.
14. Accessories: Control and protective switching devices. Current transformers. Digital metering equipment.
15. Execution: [Installing switchgear generally](#)

### **Distribution boards**

1. Standards: To [BS EN 61439-1](#) and [BS EN 61439-3](#).
2. Rated operational voltage ( $U_e$ ): 230/400VAC
3. Incoming device: As indicated in the bills of quantities
4. Outgoing devices
  - 4.1. Type: As indicated in the bills of quantities
  - 4.2. Quantity: As indicated in the bills of quantities
5. Busbars and connections
  - 5.1. Type: Fully shrouded.
  - 5.2. Rated operational current ( $I_e$ ): As indicated in the bills of quantities
  - 5.3. Rated short-time withstand current ( $I_{cw}$ ) for 1 s: As indicated in the bills of quantities
6. Neutral and earth bars: Individual terminal for each outgoing circuit.
7. Neutral terminations: Match current carrying capacity of phase conductor.
8. Spare ways: As indicated in the bills of quantities
9. Enclosure
  - 9.1. Ingress protection (minimum): To [BS EN 60529](#), IP44.
  - 9.2. Material: Steel.
  - 9.3. Finish: Polyester powder-coated.
  - 9.4. Locking mechanism: Cylinder locks with a standard key type.
10. Accessories: Digital metering equipment. Padlocks and keys.



11. Execution: Installing switchgear generally Type A

**Automatic transfer switching equipment (TSE)**

1. Standards: To [BS EN 60947-1](#) and [BS EN 60947-6-1](#).
2. Short-circuit capability: PC.
3. Method of controlling transfer: ATSE.
4. Operating sequence: I-O-II.
5. Operating mechanism: Automatic via 230 V a.c. motor and manual override.
6. Rated operational voltage (Ue): 415 V.
7. Rated impulse withstand voltage (Uimp) : 10 kV.
8. Rated insulation voltage (Ui): 800 V.
9. Rated operational current (In): As indicated in the bills of quantities
10. Rated operational frequency: 50 Hz.
11. Number of poles: Four.
12. Rated short-time withstand current (Icw) for 1 s: As indicated in the bills of quantities
13. Rated short-circuit making capacity (Icm): As indicated in the bills of quantities
14. Rated short-circuit breaking capacity (Icn): As indicated in the bills of quantities
15. Terminals: Suitable for the connection of solid copper conductors.

16. Controls

- 16.1. Type: Solid state microprocessor based.
- 16.2. Display type: Liquid crystal display (LCD).
- 16.3. Illuminated display to indicate the following conditions: Single-phase voltage on Line 1. Single-phase voltage on Line 2. Three-phase voltage on Line 2. Frequency on Line 1. Frequency on Line 2.
- 16.4. User-adjustable functions: Voltage threshold. Frequency threshold. Switching delay. Dead band time L1-L2.
- 16.5. Communication module: Integral with controls to allow remote monitoring and operation of switch.

17. Enclosure

- 17.1. Ingress protection (minimum): To [BS EN 60529](#), IP42.
- 17.2. Impact protection (minimum): To [BS EN 62262](#), IK10.
- 17.3. Material: Sheet steel.
- 17.4. Finish: Polyester powder-coated.
- 17.5. Colour: As indicated in the bills of quantities
- 17.6. Gland plates: Pre-drilled cable knock-outs.

18. Execution: Installing switchgear generally Type B

**Uninterruptible power supply (UPS) units**

1. Standards: To [BS EN 62040-1](#) and [BS EN 62040-3](#).
2. Test requirements: Factory tests. Submit type test certificates.
3. Mode of operation: LOn-line.
4. Configuration: Single with bypass.
5. Load compatibility: Suitable for use with loads operating at any power factor (leading or lagging) up to 0.9.
6. Input

- 6.1. Nominal voltage: Three phase 400 V a.c.
- 6.2. Voltage tolerance:  $\pm 10\%$  at full load.
- 6.3. Frequency: 50 Hz.  $\pm 2\%$ .
- 6.4. Power factor:  $>0.98$  at full load.
- 6.5. Input current distortion (THDi):  $<3\%$  at full load.
- 6.6. Inrush current: Limited by soft start to maximum  $I_n$ .
- 7. Maintenance bypass: Internal fully interlocked.
- 8. Integral bypass operation
  - 8.1. Automatic transfer of the load to the bypass source under the following conditions: Fault condition. Inverter over temperature. Inverter overload capacity exceeded.
  - 8.2. Re-transfer of the load from the bypass source: Automatic unless under manual control or fault conditions are present.
- 9. Inverter output
  - 9.1. Rated output apparent power: As indicated in bills of quantities
  - 9.2. Nominal voltage: Three phase 400 V a.c.
  - 9.3. Voltage tolerance:  $<\pm 1\%$  static.
  - 9.4. Voltage waveform: Sinusoidal in both normal and stored energy mode of operation.
  - 9.5. Voltage distortion: As indicated in bills of quantities
  - 9.6. Nominal frequency: 50 Hz.
  - 9.7. Frequency tolerance:  $\pm 0.1\%$  with internal reference (free running).
  - 9.8. Overload capability: As indicated in bills of quantities
  - 9.9. Operation on overload: Operate visual and audible alarm indicator integral to UPS enclosure.
  - 9.10. Output power factor (minimum): As indicated in bills of quantities
  - 9.11. Crest factor: As indicated in bills of quantities
- 10. Batteries
  - 10.1. Location: Separate battery enclosures.
  - 10.2. Type: As indicated in bills of quantities
  - 10.3. Voltage: As indicated in bills of quantities
  - 10.4. Number of cells (minimum): As indicated in bills of quantities
  - 10.5. Battery autonomy (stored energy time at rated power): As indicated in bills of quantities
  - 10.6. Battery service life (minimum): 15 years
  - 10.7. Impact resistant plastic shields to intercell terminal and output terminals: Required.
  - 10.8. Battery supply d.c. circuit breaker with overload and short circuit protection: Required.
  - 10.9. Battery charger: Automatic temperature and float voltage compensation.
  - 10.10. Battery monitors
    - 10.10.1. Type: Microprocessor based.
    - 10.10.2. Features: Standby time remaining. Estimated remaining battery service life. Detection of excessive temperature. Detection of faulty battery. Battery voltage. Automatic battery discharge test at adjustable time intervals and with manual override.

## 11. Controls, indicators and alarms

### 11.1. Status indicators

11.1.1. During normal operation (on-line) indicate the following with green LED: a.c. input to rectifier. a.c. input to bypass. Load supplied from battery. Load supplied from inverter. Load supplied from bypass.

11.1.2. During mains failure indicate the following with green LED: Load supplied from battery. Load supplied from inverter.

11.1.3. During mains failure indicate the following with red LED: a.c. input to rectifier. a.c. input to bypass.

11.2. LCD display: Input voltage to inverter. Input voltage to bypass. Output voltage from UPS. Battery charger current. Input voltage to battery. Output voltage from battery. Input frequency. Output frequency. Output current. Output active power kW. Output apparent power (kV·A).

11.3. Event log: Record up to 64 fault occurrences including time and date for each occurrence. Provide user access to event log through LCD display.

## 12. Audible alarms

12.1. Type: Integral alarm within UPS enclosure providing minimum 65 dBA at 1 m.

12.2. Activation and reset: Activated by any fault condition. Continuous output until fault cleared or alarm silenced. Silencing of the alarm must not clear LED status indication.

13. Communications and signalling: SNMP adaptor. RS 485 port.

## 14. Enclosure

14.1. Ingress protection (minimum): To [BS EN 60529](#), IP31.

### 14.2. Material and construction

14.2.1. Type: Welded carbon steel. Assemble to prevent distortion when the complete enclosure is lifted or transported.

14.2.2. Finish: Epoxy powder coated.

14.3. Lockable access doors: Required.

14.4. Cable entry with removable gland plates: For top entry cables.

### 14.5. Ventilation arrangement

14.5.1. Type: Duplicate forced ventilation fans.

14.5.2. Fan failure alarms: Required.

### 14.6. Noise emission

14.6.1. Sound pressure level in normal mode (maximum): 60 dBA at 1 m.

14.6.2. Sound pressure level in battery mode (maximum): 60 dBA at 1 m.

## 15. Efficiency

15.1. Overall (minimum): As indicated in bills of quantities

15.2. Eco mode (minimum): As indicated in bills of quantities

16. Execution: Installation of UPS; Factory inspections of UPS equipment; Installing UPS batteries; Installing external maintenance bypass

## **Cable ladders**

1. Standard: To [BS EN 61537](#).

2. Material: Metal.

3. Resistance against flame propagation: Non-flame-propagating.

4. Electrical properties
  - 4.1. Continuity characteristics: Without electrical continuity.
  - 4.2. Conductivity characteristics: Without electrical conductive system component.
5. Coating material: Powder coating.
6. Temperature properties for transport, storage, installation and application
  - 6.1. Minimum: 5°C.
  - 6.2. Maximum: +40°C.
7. Mechanical properties
  - 7.1. Cable ladder free base area: Class X.
  - 7.2. Resistance to impact: Up to 20 J.
8. Width: As indicated in bills of quantities
9. Features
  - 9.1. Segregation: Not required.
  - 9.2. Protective cover: Not required.
10. Execution: Installing cable tray and cable ladder Type A; Multiple cable runs

### **Cable ties**

1. Standard: To [BS EN IEC 62275](#).
2. Format: Wrap around self-locking releasable.
3. Material: Nylon.
4. Loop tensile strength (minimum): 80 N.
5. Temperatures for permanent installation
  - 5.1. Maximum: 75°C.
  - 5.2. Minimum: 0°C.
6. Contribution to fire : Non-flame-propagating.
7. Environmental influences
  - 7.1. Non-metallic and composite components: Resistant to ultraviolet light.
  - 7.2. Metallic and composite components: Resistant to corrosion.

### **Cable trunking**

1. Standards: To [BS EN 50085-1](#) and [BS EN 50085-2-1](#).
2. Installation position: Surface mounted on the wall.
3. Format: 3.
4. Resistance to compression: 320 N.
5. Resistance to impact: 2 J.
6. Temperature properties
  - 6.1. Storage and transport temperature (minimum): -5°C.
  - 6.2. Installation and application temperature (minimum): +5°C.
  - 6.3. Application temperature (maximum): +60°C.
7. Resistance to flame propagation: Non-flame-propagating.
8. Electrical properties: With electrical insulating characteristics.
9. Protection by enclosure
  - 9.1. Protection against ingress of solid objects (minimum): To [BS EN 60529](#), IP4X.

- 9.2. Protection against ingress of water (minimum): To [BS EN 60529](#), IPX1.
- 9.3. Protection against access to hazardous parts (minimum): To [BS EN 60529](#), IPXXD.
- 10. Access method: Without tools.
- 11. Screening: Not required.
- 12. Sizes: As indicated in bills of quantities
- 13. Compartments: Three.
- 14. Accessories and fittings
  - 14.1. Generally: Factory made by the cable trunking or ducting manufacturer and of the same material type and finish as the cable trunking or ducting.
  - 14.2. Types: PVC covers.
- 15. Execution: [Installing trunking generally](#)

### **Conduit fittings**

- 1. Standards: To [BS EN 61386-1](#) and to [BS EN 61386-21](#), [BS EN 61386-22](#), or [BS EN 61386-23](#) as appropriate.
- 2. Material
  - 2.1. Type: PVC-U.
  - 2.2. Finish: Match conduit.
- 3. Conduit boxes: Fit covers of same material and finish as boxes. Include brass earthing terminals in PVC-U boxes.
- 4. Plugs
  - 4.1. For non-metallic boxes: Solvent PVC-U.
- 5. Locknuts
  - 5.1. For non-metallic boxes: Hexagonal PVC-U.
- 6. Execution: [Installing conduit, trunking and ducting](#)

### **Multicore screened thermosetting-insulated (LSHF) sheathed cables**

- 1. Standard: To [BS 8436](#).
- 2. Third-party certification: British Approvals Service for Cables ([BASEC](#))-certified.
- 3. Size: As indicated in bills of quantities
- 4. Sheath colour: Black.
- 5. Reaction to fire class
  - 5.1. Fire behaviour: B2<sub>ca</sub>.
  - 5.2. Additional classification for smoke production: s1.
  - 5.3. Additional classification for flaming droplets and/ or particles: d1.
- 6. Execution: [Installing low-voltage cables in conduit and trunking](#); [Cable installation on channel cable supports, cable tray, cable ladder and cable basket](#)

### **Single-core non-sheathed (LHSF) insulated cables**

- 1. Standards: To [BS EN 50525-1](#) and [BS EN 50525-3-41](#).
- 2. Third-party certification: British Approvals Service for Cables ([BASEC](#))-certified.
- 3. Cable type: H07Z-R.
- 4. Size: As indicated in bills of quantities
- 5. Reaction to fire class
  - 5.1. Fire behaviour: C<sub>ca</sub>.
  - 5.2. Additional classification for smoke production: s1.

- 5.3. Additional classification for flaming droplets and/ or particles: d1.
6. Execution: [Installing low-voltage cables Type C](#); [Installing low-voltage cables in conduit and trunking Type A](#)

### **Miniature circuit breakers**

1. Standards: To [BS EN 60898-1](#) and [BS EN 60898-2](#).
2. Third party certification: [ASTA Type test certification](#).
3. Rated operational current (In): As indicated in bills of quantities
4. Rated operational voltage (Ue): As indicated in bills of quantities
5. Rated impulse withstand voltage (Uimp) : As indicated in bills of quantities
6. Rated frequency: 50 Hz.
7. Number of poles: As indicated in bills of quantities
8. Rated short-circuit capacity (Icn): As indicated in bills of quantities
9. Tripping characteristic: As indicated in bills of quantities
10. Pollution degree category: 2.
11. Features: Adjustable thermal release short-time delay setting.
12. Mounting method: DIN rail.
13. Accessories: Arc fault detection device to [BS EN 62606](#). Auxiliary switch. Locking kit. Phase barriers. Remote control switching device. Shunt trip release. Terminal covers. Undervoltage release.

### **Hybrid electrical filters**

1. Reactive power rating: As indicated in bills of quantities
2. Active filter rating: As indicated in bills of quantities
3. Operating voltage and frequency (nominal): 400 V a.c., 50 Hz.
4. Harmonic current to be compensated: 5th.
5. Enclosure
  - 5.1. Ingress protection (minimum): To [BS EN 60529](#), IP41.
6. Execution: [Installing harmonic filters](#)

### **Current transformers**

1. Standard: To [BS EN 61869-2](#).
2. Accuracy classification
  - 2.1. For use with protective equipment: 5.
  - 2.2. For use with measuring equipment: 5.
3. Format: Cast resin encapsulated split ring.
4. Size: Manufacturer Standard
5. Primary rating: As indicated in bills of quantities
6. Secondary rating: As indicated in bills of quantities
7. Rated short time current: Match the rating of the circuit in which the current transformer is installed.
8. Test links: Provide for connection of calibration instruments and meters.
9. Mounting arrangement: Busbar.
10. Execution: [Installing current transformers](#)

### **Digital multifunction metering equipment**

1. Display type: Liquid crystal display (LCD).

2. **Ingress protection (minimum):** Match high voltage switchgear.
3. **Metering functions:** Active energy (kWh). Active power (kW). Apparent power (kVA). Frequency (Hz). Maximum active power demand (kW). Phase currents (A). Power factor. Pulsed output (kWh). Reactive power (kVA(r)). Voltage between phases (V).
4. **Mounting:** Recessed into switchgear.
5. **Execution:**

### **Battery shelving racks**

1. **Arrangement:** Free standing fully clad.
2. **Material:** Welded carbon steel.
3. **Finish:** Epoxy powder coated.

## **Execution**

### **Installing switchgear generally**

1. **General requirements:** [Labelling switchgear](#)
2. **Switchgear cubicles:** Arrange in modular form to facilitate future extension.
3. **Clearance (minimum)**
  - 3.1. **Front access switchgear:** 1000 mm in front of switchgear.
  - 3.2. **Rear access switchgear:** 1000 mm in front of and behind switchgear.
4. **Fixing equipment**
  - 4.1. **Generally:** Fix independently of wiring installation with zinc electroplated fasteners.
  - 4.2. **Indoor equipment:** Fix using internal lugs.
  - 4.3. **Outdoor equipment:** Fix using external lugs.
5. **Orientation:** Accurate and square to vertical and horizontal axes. Align adjacent items of switchgear on the same horizontal axis.
6. **Extension boxes:** Provide where necessary.
7. **Gland plates:** Non-ferrous for single core cables.
8. **Interconnection of close coupled switchgear**
  - 8.1. **Cable type:** Single core PVC-insulated cables for switchgear and controlgear.
  - 8.2. **Containment:** Manufacturer's enclosure.
9. **Identification**
  - 9.1. **Neutral and earth bar terminals:** Label with the outgoing circuit reference.
  - 9.2. **Cable terminations:** Label with circuit reference, with push-on plastics markers.

### **Installing switchgear generally Type A**

1. **General requirements:** [Labelling switchgear Type A](#)
2. **Switchgear cubicles:** Arrange in modular form to facilitate future extension.
3. **Clearance (minimum)**
  - 3.1. **Front access switchgear:** 1000 mm in front of switchgear.
  - 3.2. **Rear access switchgear:** 1000 mm in front of and behind switchgear.
4. **Fixing equipment**
  - 4.1. **Generally:** Fix independently of wiring installation with zinc electroplated fasteners.
  - 4.2. **Indoor equipment:** Fix using internal lugs.
  - 4.3. **Outdoor equipment:** Fix using external lugs.
5. **Orientation:** Accurate and square to vertical and horizontal axes. Align adjacent items of switchgear on the same horizontal axis.

6. Extension boxes: Provide where necessary.
7. Gland plates: Non-ferrous for single core cables.
8. Interconnection of close coupled switchgear
  - 8.1. Cable type: Single core PVC-insulated cables for switchgear and controlgear.
  - 8.2. Containment: Manufacturer's enclosure.
9. Identification
  - 9.1. Neutral and earth bar terminals: Label with the outgoing circuit reference.
  - 9.2. Cable terminations: Label with circuit reference, with push-on plastics markers.

### **Installing switchgear generally Type B**

1. General requirements: [Labelling switchgear Type B](#)
2. Switchgear cubicles: Arrange in modular form to facilitate future extension.
3. Clearance (minimum)
  - 3.1. Front access switchgear: 1000 mm in front of switchgear.
  - 3.2. Rear access switchgear: 1000 mm in front of and behind switchgear.
4. Fixing equipment
  - 4.1. Generally: Fix independently of wiring installation with zinc electroplated fasteners.
  - 4.2. Indoor equipment: Fix using internal lugs.
  - 4.3. Outdoor equipment: Fix using external lugs.
5. Orientation: Accurate and square to vertical and horizontal axes. Align adjacent items of switchgear on the same horizontal axis.
6. Extension boxes: Provide where necessary.
7. Gland plates: Non-ferrous for single core cables.
8. Interconnection of close coupled switchgear
  - 8.1. Cable type: Single core PVC-insulated cables for switchgear and controlgear.
  - 8.2. Containment: Manufacturer's enclosure.
9. Identification
  - 9.1. Neutral and earth bar terminals: Label with the outgoing circuit reference.
  - 9.2. Cable terminations: Label with circuit reference, with push-on plastics markers.

### **Labelling switchgear**

1. Switchgear terminals: To [BS EN 60445](#).
2. Standby power: Provide danger warning notices stating that assemblies may be energized from more than one source.
3. Indicator lamps: Label each lamp describing its function.
4. Fuses, terminal blocks and other assembly components: Label describing their purpose.
5. Spare fuses: Label, describe their rating and associated outgoing ways.

### **Labelling switchgear Type A**

1. Switchgear terminals: To [BS EN 60445](#).
2. Standby power: Provide danger warning notices stating that assemblies may be energized from more than one source.
3. Indicator lamps: Label each lamp describing its function.
4. Fuses, terminal blocks and other assembly components: Label describing their purpose.
5. Spare fuses: Label, describe their rating and associated outgoing ways.



## **Labelling switchgear Type B**

1. **Switchgear terminals:** To [BS EN 60445](#).
2. **Standby power:** Provide danger warning notices stating that assemblies may be energized from more than one source.
3. **Indicator lamps:** Label each lamp describing its function.
4. **Fuses, terminal blocks and other assembly components:** Label describing their purpose.
5. **Spare fuses:** Label, describe their rating and associated outgoing ways.

## **Factory inspections of UPS equipment**

1. **Notice before inspection and testing:** Fourteen days.
2. **Witnessing:** Arrange for factory testing to be witnessed by the contract administrator and one colleague.
3. **Scope:** Factory test UPS equipment before delivery to site.
4. **Tests**
  - 4.1. **Standard:** To [BS EN 62040-3](#).
  - 4.2. **Routine tests:** Undertake.
  - 4.3. **Special tests:** Balanced load test. Efficiency test. Harmonic components test. Input voltage and frequency test. Inrush current test.
5. **Test equipment calibration certificates:** Submit.
6. **Test report:** Submit.

## **Installation of UPS**

1. **Standard:** In accordance with [BS 7671](#).
2. **Transportation, off-load and installation:** Submit method statement.
3. **Weight limit:** None.
4. **Assembly:** Replace fittings removed for transport.
5. **UPS units:** Interconnect.
6. **UPS controls and batteries:** Interconnect.
7. **Identification labels:** UPS 1.

## **Installing UPS batteries**

1. **Batteries:** Interconnect individual cells.
2. **Battery circuit breaker:** Interconnect with UPS units and batteries.

## **Installing external maintenance bypass**

1. **Interconnection:** Interconnect with UPS, mains supply and load.

## **Installing cable tray and cable ladder Type A**

1. **Standards:** In accordance with [BS 7671](#) and [IET Guidance Note 1](#).
2. **Preparation**
  - 2.1. **Burrs and sharp edges:** Make smooth.
  - 2.2. **Cutting:** Minimize and make good edges. Cuts to cable tray to be square along an unperforated line.
  - 2.3. **Treatment of cut surface:** Extend 25 mm beyond the cut. Match finish of cable supports.
3. **Access:** Provide space around cable ladder and tray to permit access for installing and maintaining cables.
4. **Joints and expansion couplers**
  - 4.1. **Position:** Locate between the bracket support and the quarter point.

- 4.2. **Number of joints:** Minimize.
- 4.3. **Lengths of cable ladder and tray:** Maximize.
- 4.4. **Ends:** Blank with end plates.
5. **Changes of size and direction:** Manufacturer's accessories of the same material type, pattern, finish and thickness as cable supports.
6. **Fire barriers:** Provide where required to maintain fire performance of fabric.
7. **Protective covers:** Provide to cables requiring mechanical protection.
8. **Support**
  - 8.1. **Fixing arrangement:** Independently fix and support from building structure using threaded rod fixed to channel cable support with shake proof washers and hex nuts.
  - 8.2. **Clearance from building fabric (minimum):** 20 mm.
9. **Components:** Avoid contact between dissimilar metals.
10. **Routing of cable ladder and tray:** Submit drawings showing the proposed routes of cable ladder and cable tray.

### **Multiple cable runs**

1. **Requirement:**

### **Installing conduit, trunking and ducting**

1. **Standards:** In accordance with [BS 7671](#) and [IET Guidance Note 1](#).
2. **Preparation:** Cut square. Remove burrs and sharp edges to make smooth.
3. **Protection of metallic conduit, trunking and ducting**
  - 3.1. **Joints and ends:** Remove grease, oil, dirt and rust before applying protective paint. Paint immediately following installation.
  - 3.2. **Protective paint**
    - 3.2.1. **Generally:** Compatible with conduit, trunking and ducting finish.
    - 3.2.2. **Type:** Match factory finish.
4. **Cross-sectional area:** Maintain throughout the conduit, trunking and ducting length.
5. **Arrangement:** Position vertically and horizontally in line with equipment served, and parallel with building lines.
6. **Draw wires:** Install galvanized soft iron wires within spare conduit, trunking and ducting.
7. **Distance from other services running parallel (minimum)**
8. **Drainage of conduit, trunking and ducting:** Locate drainage outlets at lowest points in conduit, trunking and ducting installed externally, and where condensation may occur.
9. **Fire barriers:** Provide to maintain integrity of fire compartments.
10. **Rewireable installations:** Enable rewiring from accessible boxes or accessories only.
11. **Support:** Independently fix and support conduit, trunking and ducting from building structure.
12. **Cleaning:** Clean insides of conduit, trunking and ducting before installing cables.
13. **Cabling:** Install when conduit, trunking and ducting enclosure is complete.
14. **Submittals:** Submit manufacturer's technical information. Submit drawings showing the proposed routes of conduit, trunking and ducting and the location of service outlets.

### **Installing trunking generally**

1. **Changes of direction:** Manufacturer's bends and tees.
2. **Joints**

- 2.1. **Generally:** Manufacturer's jointing fittings. Maintain rigidity of trunking across joint.
- 2.2. **Number of joints:** Minimize.
- 2.3. **Lengths of trunking:** Maximize.
- 2.4. **Open ends:** Blank using manufacturer's removable end caps.
- 2.5. **Metal edging:** Protect with PVC edging strip.
- 2.6. **Electrical continuity:** Maintain at each joint with a copper link fitted on the outside of the trunking.
3. **Connections to conduit, boxes, equipment and accessories:** Screwed couplings, adaptors, connectors and glands, with rubber bushes at open ends.
4. **Connections to trunking covers:** Minimize.
5. **Electrical continuity of covers:** Electrically continuous with the trunking or provide protective conductors.
6. **Access:** Provide space around trunking to permit access for installing and maintaining cables. Set out access with covers on a continuous face to allow cabling to be laid in throughout its entire length.
7. **Trunking passing through building fabric openings:** Provide fixed trunking covers. Extend covers 50 mm from both sides of the opening.
8. **Cable retaining straps:** Required except when trunking cover is on top.

### **Installing low-voltage cables Type C**

1. **Standard:** In accordance with [BS 7671](#).
2. **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
3. **Preparation:** Store cables above 5°C for 24 hours before installation.

Clear cable path of debris.

4. **Installation temperature (minimum):** 5°C.
5. **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
6. **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
7. **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
8. **Concealed cable runs to wall accessories:** Run vertically from the accessory.
9. **Exposed cable runs:** As indicated in bills of quantities
10. **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
11. **Jointing and termination**
  - 11.1. **Final circuit cables:** At electrical accessories only.
  - 11.2. **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - 11.3. **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### **Installing low-voltage cables in conduit and trunking**

1. **Cable installation:** Orderly and capable of being withdrawn.
2. **Single core wiring:** Arrange using the loop-in method.

3. **Cables within trunking:** Tie at 2 m intervals for cables of the same circuit reference. Label ties with circuit reference number at 10 m intervals.
4. **Cables in vertical conduit:** Provide cable clamps in accessible conduit boxes at 5 m intervals.
5. **Extra-low-voltage cables:** Install within a separate partition from low-voltage cables where installed in multi compartment trunking.

### **Installing low-voltage cables in conduit and trunking Type A**

1. **Cable installation:** Orderly and capable of being withdrawn.
2. **Single core wiring:** Arrange using the loop-in method.
3. **Cables within trunking:** Tie at 2 m intervals for cables of the same circuit reference. Label ties with circuit reference number at 10 m intervals.
4. **Cables in vertical conduit:** Provide cable clamps in accessible conduit boxes at 5 m intervals.
5. **Extra-low-voltage cables:** Install within a separate partition from low-voltage cables where installed in multi compartment trunking.

### **Cable installation on channel cable supports, cable tray, cable ladder and cable basket**

1. **Cabling:** Install when cable supports are complete.
2. **Position:** Place single and multicore cables side by side.
3. **Fastening**
  - 3.1. **Fastenings generally:** Secure cables, do not indent sheaths. Position to enable any submain cable to be individually removed.
  - 3.2. **Submain cables <math><95 \text{ mm}^2</math>:** Cable bands at 350 mm (maximum) horizontal spacing and 450 mm (maximum) vertical spacing.
  - 3.3. **Submain cables >math>>95 \text{ mm}^2</math>:** Cable bands at 900 mm (maximum) horizontal spacing and 1100 mm (maximum) vertical spacing.
  - 3.4. **Final circuit cabling:** Cable ties at 250 mm (maximum) spacing.
  - 3.5. **Extra-low-voltage, communications and fibre-optic cabling:** Cable ties at 250 mm (maximum) spacing.

### **Installing harmonic filters**

1. **Standard:** In accordance with [BS 7671](#).
2. **Point of installation:** Main switchboard.
3. **Mounting:** Free standing.
4. **Clearance (minimum)**
  - 4.1. **Front access:** 1000 mm.
  - 4.2. **Rear access:** 1000 mm.
  - 4.3. **Top access:** 300 mm.
  - 4.4. **Bottom access:** 300 mm.
  - 4.5. **Side access:** 50 mm.
5. **Gland plates:** Form common slot to all holes to prevent eddy currents.

### **Installing current transformers**

1. **Standard:** In accordance with [BS 7671](#).
2. **Identification details:** Mount current transformers so that polarity markings and name plate details are easily viewed in situ.

## **Factory inspections**

1. Notice before inspection and testing: 14 days.
2. Equipment for inspection and testing: All switchboards
3. Factory inspections
  - 3.1. Custom made products: Inspection required.
  - 3.2. Assembly completed, busbars exposed and functional units assembled: Inspection not required.
  - 3.3. Factory testing of assembly: Inspection not required.

## **Installing low-voltage distribution systems**

1. Standard: In accordance with [BS 7671](#).
2. Layout: Position cabling and equipment to provide safe and easy access for operation and maintenance.

## **Thermal video imaging surveys of low-voltage distribution systems**

1. Thermal imaging personnel: Specialist thermographer.
2. Results
  - 2.1. Number of copies: Two.

## **Connection to the incoming supply**

1. Customer's installation: At Electricity Supplier Metering Equipment

## **System completion**

### **Inspecting, testing and commissioning of switchgear generally**

1. Standard: In accordance with [BS 7671](#).
2. Notice before testing and commissioning: Seven days.
3. Switches and circuit breakers: Clean to remove all visible traces of dust.
4. Protective devices settings: Configure to match the grading study.
5. Switchboard monitoring: Continuous for 30 minutes following first energizing.
6. Additional inspecting and testing: Check levelling and alignment of assembly. Check operation of instruments and metering devices. Check and adjust tightness of busbar connections and supports. Check tightness of bolted connections. Check busbar joints with duct or resistance measurements. Check earth connections at compartments, switches and earth electrodes. Check clearance of live parts from direct contact. Check polarity and phase sequence of protective devices. Check operation of protective devices using secondary and primary current injection. Manually operate protective devices. Carry out earth fault protection simulation tests. Check functional operation of circuit breakers. Check operation of switch tripping devices.
7. Testing and commissioning results: Submit one copy.
8. Certificates of calibration for meters and instruments: Submit.

### **Inspecting, testing and commissioning harmonic filters**

1. Standard: In accordance with [BS 7671](#).
2. Commissioning of filters: By manufacturer.
3. Notice before testing and commissioning: Seven days.
4. Operation of instruments and displays: Check and confirm correct display of: Supply current (rms) L1, L2, L3 and neutral current. Load current (rms) L1, L2, L3 and neutral current. Supply THD % L1, L2, L3. Load THD % L1, L2, L3. Supply voltage. Load on the filter expressed as a percentage for L1, L2, L3. Detailed load current spectrum including individual measurement of the fundamental, and each harmonic up to and including 25th expressed as a percentage, and the TDHI of the current absorbed by the load.

5. Detailed supply current spectrum including individual measurement of the fundamental, and each harmonic up to and including 25th expressed as a percentage, and the TDHI of the current supplied by the electricity distributor. Check and confirm correct operation of: Reactive compensation. Selection of harmonic orders for mitigation. Number of parallel connected filters. Alarm functions. Communication port function. Identification function.
6. **Controls:** Commission and adjust for optimum harmonic mitigation and reactive power compensation.
7. **Inspecting, testing and commissioning results:** Submit one copy.

### **Inspecting, testing and commissioning UPS equipment**

1. **Standards:** In accordance with [BS 7671](#) and [BS EN 62040-3](#).
2. **Method statement:** Submit.
3. **Phase rotation:** Verify.
4. **Emergency and safety circuits:** Check.
5. **Correct operation of alarms and controls:** Confirm.
6. **Insulation resistance tests:** Test interconnecting cables. Test forced cooling fan motors.
7. **Site tests:** In accordance with [BS EN 62040-3](#).
8. **Operational tests:** a.c. input failure test. a.c. input return test. Acoustic noise test. Battery ripple current measurement. Current division test. Earth fault test. Overload capability test. Rated restored energy time. Rated stored energy time test. Restart test. Short circuit test. Short circuit protection device test. Simulation of parallel redundant UPS fault test. Synchronization test. Transfer test. UPS efficiency test. UPS auxiliary devices test. Ventilation test.
9. **Output tests:** Harmonic components measurement. Frequency variation test. Output over voltage test. Output frequency slew rate test. Periodic output voltage variation test. Radiofrequency interference and conducted noise test.
10. **Load tests:** Light load test. Unbalanced load test. Balanced load test. Full load test.
11. **Standby generator compatibility tests:** Required.

### **Documentation**

1. **Operating and maintenance instructions**
  - 1.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 1.3. **Format:** Electronic.
  - 1.4. **Number of copies:** Two.
2. **Record drawings**
  - 2.1. **Content:** For all low-voltage distribution circuits: the cable origin, circuit designation, route, loading, conductor material and c.s.a., insulation type and colour, number of cores per cable, number of cables in trunking and conduit. Whether cables are run on surface, concealed in walls, floors, above suspended ceilings or within roof spaces. Location, route and depth of underground cables. Location of LV switchgear including distribution boards. Routes of trunking, conduit, cable tray and cable ladders. Schematic drawings showing all low-voltage distribution circuits: the cable origin, circuit designation, cable type, size, number of cores, size and type of overcurrent protective device.

- 2.2. Drawing format: Electronic drawing.
3. Number of copies: Two.
4. Submittal date: At handover

## **Hardwired low-voltage small power systems**

### **Systems**

#### **Hardwired low-voltage small power systems**

1. System performance: Design of low voltage small power systems; Low voltage small power cables generally; Selection of conduit, trunking and ducting generally; Multi-gang power outlets
2. Connection to low voltage supply: As indicated in the drawings
3. Final circuit cabling: PVC-insulated and sheathed cables Type A
4. Cable accessories: Reference to missing clause Cable ties Type A; Cable cleats
5. Containment: Reference to missing clause Cable trays Type B; Reference to missing clause Cable trunking Type A
6. Rewireable installation: Required.
7. Concealed installation: Required.
8. Partial installation: Required.
9. Final connections: Light-duty heat-resistant PVC-insulated and sheathed flexible cables
10. Electrical accessories and outlets: Cable outlet plates; Double pole switches; Multi-gang power outlets; Industrial plugs; Industrial socket outlets; Standard socket outlets
11. Electrical identification: Electrical diagrams Type B; Equipment labels and warning notices Type A; Electrical shock treatment signs Type A
12. Execution: Small power installation; Installing cabling to socket outlets; Removing small power systems
13. System completion: Documentation

#### **System performance**

##### **Design of low voltage small power systems**

1. Provision of small power: For fixed and portable equipment requiring power.
2. Design: Complete for the low voltage small power systems.
3. Standards: In accordance with [BS 7671](#).
4. Diversity: In accordance with [IET Guidance Note 1](#).
5. Spare capacity throughout the small power system: 20%.
6. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.

##### **Low voltage small power cables generally**

1. Standard: In accordance with [BS 7671](#).
2. Proposed selection of low voltage cables: Submit drawings, technical information, calculations and manufacturers' literature.
3. Conductor sizes (minimum): As indicated in the bills of quantities
4. Cable sizes not stated: Submit.
5. Format: Amtech.

##### **Selection of conduit, trunking and ducting generally**

1. Standard: In accordance with [BS 7671](#).
2. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
3. Conduit, trunking and ducting sizes not stated: Submit.

##### **Multi-gang power outlets**

1. Quantity: As indicated in the bills of quantities



## **Products**

### **Electrical diagrams Type B**

1. **Material:** Engraved plastics laminate.
2. **Format:** Single line engineering drawings to [BS EN 61082-1](#).
3. **Information to be included:** Supply characteristics. Maximum demand. Cable types and sizes. Switchgear ratings. Protective device types, ratings and function. Prospective fault current values at each item of switchgear. Earth fault loop impedance values at each item of switchgear. Circuits containing equipment vulnerable to testing.
4. **Size:** A1.

### **Electrical shock treatment signs Type A**

1. **Format:** Plastics encapsulated.
2. **Content:** Text and images.
3. **Size:** 500 x 400 mm
4. **Geometric shape:** Rectangular horizontally.
5. **Colours:** Full colour.

### **Equipment labels and warning notices Type A**

1. **Material:** Face engraved rigid plastic laminate.
2. **Label size:** As indicated in bills of quantities
3. **Colour**
  - 3.1. **Background:** White.
  - 3.2. **Lettering:** Black.
4. **Typography**
5. **Notice wording:** As indicated in the bills of quantities

### **Cable cleats**

1. **Standard:** To [BS EN 61914](#).
2. **Format:** Aluminium trefoil single fixing clamps.
3. **Material:** Composite.
4. **Temperatures for permanent installation**
  - 4.1. **Maximum:** 40°C.
  - 4.2. **Minimum:** -5°C.
5. **Resistance to impact:** Medium.
6. **Type of retention or resistance to electromechanical forces:** With lateral retention.
7. **Environmental influences**
  - 7.1. **Non-metallic and composite components:** Resistant to ultraviolet light.
  - 7.2. **Metallic and composite components:** Low resistance to corrosion.

### **Light-duty heat-resistant PVC-insulated and sheathed flexible cables**

1. **Standards:** To [BS EN 50525-1](#) and [BS EN 50525-2-11](#).
2. **Cable type:** H03V2V2-F.
3. **Size:** As indicated in the bills of quantities
4. **Sheath colour:** Black.
5. **Reaction to fire class**
  - 5.1. **Fire behaviour:** C<sub>ca</sub>.
  - 5.2. **Additional classification for smoke production:** s1.

5.3. Additional classification for flaming droplets and/ or particles: d1.

5.4. Additional classification for acidity: a2.

6. Execution: [Installing flexible cables Type A](#)

### **PVC-insulated and sheathed cables Type A**

1. Standard: To [BS 6004](#).

2. Cable type: 6241Y.

3. Size: As indicated in the bills of quantities

4. Sheath colour: Grey.

5. Reaction to fire class

5.1. Fire behaviour: C<sub>ca</sub>.

5.2. Additional classification for smoke production: s1.

5.3. Additional classification for flaming droplets and/ or particles: d1.

5.4. Additional classification for acidity: a2.

6. Execution: [Installing low-voltage cables Type E](#); [Installing low-voltage cables in conduit and trunking Type B](#)

### **Cable outlet plates**

1. Standard: To [BS 5733](#).

2. Current rating: As indicated in the drawings

3. Mounting: Flush.

4. Flex outlet: Side entry.

5. Ingress protection (minimum): To [BS EN 60529](#), IP 20.

6. Cable termination: Screwless for rigid conductors only.

7. Plate

7.1. Material: Brass.

7.2. Finish: Polished.

8. Execution: [Installing electrical accessories](#)

### **Double pole switches**

1. Standards: To [BS EN 60669-1](#) and [BS EN 60669-2-4](#).

2. Current rating: As indicated in bills of quantities

3. Indicator lamp: LED power 'On'.

4. Mounting: Flush.

5. Ingress protection (minimum): To [BS EN 60529](#), IP 44.

6. Cable termination: Screwless for rigid conductors only.

7. Plate

7.1. Material: Brass.

7.2. Finish: Polished.

8. Insert colour: White.

9. Execution: [Installing electrical accessories Type A](#)

### **Industrial plugs**

1. Standards: To [BS EN 60309-1](#) and [BS EN 60309-2](#).

2. Material: Polycarbonate.

3. Impact protection (minimum): To [BS EN 62262](#), IK09.

4. Ingress protection (minimum): To [BS EN 60529](#), IP 44.
5. Voltage rating: 200–250 V .
6. Current rating: As indicated in the drawings
7. Frequency rating: 50–60 Hz.
8. Pin configuration: Three-pole, neutral and earth.
9. Cable termination: Screwless for solid conductors.
10. Execution: [Installing electrical accessories Type B](#)

### **Industrial socket outlets**

1. Standards: To [BS EN 60309-1](#) and [BS EN 60309-2](#).
2. Material: Polycarbonate.
3. Impact protection (minimum): To [BS EN 62262](#), IK09.
4. Ingress protection (minimum): To [BS EN 60529](#), IP 44.
5. Controls: Unswitched.
6. Mounting: Panel mount.
7. Voltage rating: 200–250 V .
8. Current rating: As indicated in drawings
9. Frequency rating: 50–60 Hz.
10. Pin configuration: Three-pole, neutral and earth.
11. Cable termination: Screwless for solid conductors.
12. Execution: [Installing electrical accessories Type C](#)

### **Multi-gang power outlets**

1. Standard: To [BS 1363-2](#).
2. Current rating: As indicated in the drawings
3. Fuse protection: To [BS 1362](#).
4. Outgoing ways
  - 4.1. Type: Individually switched socket outlets.
  - 4.2. Quantity: 4.
5. Cable length (minimum): 3 m.
6. Features: Main switch with integral neon indicating 'power on'.

### **Standard socket outlets**

1. Standard: To [BS 1363-2](#).
2. Arrangement: Single gang. Twin gang.
3. Control
  - 3.1. Type: Double pole, switched.
  - 3.2. Switch position: Outboard.
  - 3.3. Indicator lamp: Not required.
  - 3.4. Interlock: Three-pin equal pressure.
4. Mounting: Flush.
5. Features: Clean earth.
6. Ingress protection (minimum): To [BS EN 60529](#), IP 20.
7. Cable termination: Screwless for rigid conductors only.
8. Plate

- 8.1. **Material:** Brass.
- 8.2. **Finish:** Polished.
9. **Insert colour:** White.
10. **Execution:** [Installing electrical accessories Type D](#)

## **Execution**

### **Installing low-voltage cables Type E**

1. **Standard:** In accordance with [BS 7671](#).
2. **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
3. **Preparation:** Store cables above 5°C for 24 hours before installation.

Clear cable path of debris.

4. **Installation temperature (minimum):** 5°C.
5. **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
6. **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
7. **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
8. **Concealed cable runs to wall accessories:** Run vertically from the accessory.
9. **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
10. **Jointing and termination**
  - 10.1. **Final circuit cables:** At electrical accessories only.
  - 10.2. **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - 10.3. **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### **Installing low-voltage cables in conduit and trunking Type B**

1. **Cable installation:** Orderly and capable of being withdrawn.
2. **Single core wiring:** Arrange using the loop-in method.
3. **Cables within trunking:** Tie at 2 m intervals for cables of the same circuit reference. Label ties with circuit reference number at 10 m intervals.
4. **Cables in vertical conduit:** Provide cable clamps in accessible conduit boxes at 5 m intervals.
5. **Extra-low-voltage cables:** Install within a separate partition from low-voltage cables where installed in multi compartment trunking.

### **Installing flexible cables Type A**

1. **General requirements:**
2. **Cables:** Grip securely at connections. Where cord grips do not form an integral part of the accessory or equipment, provide separate proprietary cord grips.

### **Installing electrical accessories**

1. **Standard:** In accordance with [BS 7671](#).
2. **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
3. **Positioning:** Coordinate with other wall- or ceiling-mounted equipment.
4. **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.

5. **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.
6. **Mounting heights**
  - 6.1. **Generally:** Measure from finished floor level to centre line of accessory.

### **Installing electrical accessories Type A**

1. **Standard:** In accordance with [BS 7671](#).
2. **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
3. **Positioning:** Coordinate with other wall- or ceiling-mounted equipment.
4. **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.
5. **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.
6. **Mounting heights**
  - 6.1. **Generally:** Measure from finished floor level to centre line of accessory.
  - 6.2. **Light switches:**
  - 6.3. **Single voltage shaver outlets:**
  - 6.4. **Shaver supply units:**
  - 6.5. **Socket outlets:**
  - 6.6. **Fan isolators:**
  - 6.7. **Cooker control units:**
  - 6.8. **Cooker connection units:**
  - 6.9. **Telecommunications and data outlets:**
7. **Separation distance between adjacent accessories (minimum):**

### **Installing electrical accessories Type B**

1. **Standard:** In accordance with [BS 7671](#).
2. **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
3. **Positioning:** Coordinate with other wall- or ceiling-mounted equipment.
4. **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.
5. **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.
6. **Mounting heights**
  - 6.1. **Generally:** Measure from finished floor level to centre line of accessory.

### **Installing electrical accessories Type C**

1. **Standard:** In accordance with [BS 7671](#).
2. **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
3. **Positioning:** Coordinate with other wall- or ceiling-mounted equipment.
4. **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.
5. **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.
6. **Mounting heights**
  - 6.1. **Generally:** Measure from finished floor level to centre line of accessory.

### **Installing electrical accessories Type D**

1. **Standard:** In accordance with [BS 7671](#).
2. **Accessory faceplates:** Free from any traces of plaster, grout, paint or similar.
3. **Positioning:** Coordinate with other wall- or ceiling-mounted equipment.
4. **Alignment:** Align adjacent accessories on the same vertical or horizontal axis.
5. **Fixing:** Fix securely, plumb and level to vertical and horizontal axes.

## 6. Mounting heights

- 6.1. **Generally:** Measure from finished floor level to centre line of accessory.

### **Removing small power systems**

1. **Scope:** Complete installation.

### **Small power installation**

1. **Standard:** In accordance with [BS 7671](#).

### **Installing cabling to socket outlets**

1. **General:** Wire socket outlets in ring final circuits without spurs where hard wiring is employed.

## **System completion**

### **Documentation**

1. **Operating and maintenance instructions**
  - 1.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 1.3. **Format:** Paper copy.
  - 1.4. **Number of copies:** Two.
2. **Record drawings**
  - 2.1. **Content:** For all low voltage final circuits, the cable origin, circuit designation, route, loading, conductor material and c.s.a, insulation type and colour, number of cores per cable, number of cables in trunking and conduit.
  - 2.2. **Format:** Electronic drawing.
  - 2.3. **Number of copies:** Two.
3. **Submittal date:** At handover.

## **Hardwired general lighting systems**

### **Systems**

#### **Hardwired general lighting systems**

1. System performance: Lighting performance; Lighting cables generally; Conduit, trunking and ducting generally
2. Final circuit cabling: PVC-insulated and sheathed cables
3. Containment: Cable trays Type A
4. Rewireable installation: Required.
5. Concealed installation: Required.
6. Luminaire types: Emergency luminaires; Recessed luminaires; Surface luminaires; Suspended luminaires
7. Lamp types: Self-ballasted LED lamps
8. Connections to luminaires: Light-duty PVC-insulated and sheathed flexible cables
9. Lighting controls: Occupancy detectors; Plate switches; Dimmer switches and controls
10. Accessories: Externally illuminated emergency exit signs
11. Electrical identification: Electrical diagrams Type A
12. Execution: Installing emergency lighting systems
13. System completion: Testing and commissioning of general lighting systems

### **System performance**

#### **Lighting performance**

1. Task area: Floor.
2. Maintained average illuminance level (lx): As per drawings
3. Glare index (maximum): As per drawings
4. Uniformity (minimum): As per drawings
5. Colour rendering index (Ra): As per drawings
6. Colour temperature (K): As per drawings
7. Means of control: Local.

#### **Lighting cables generally**

1. Standard: In accordance with [BS 7671](#).
2. Requirement: Submit proposals, including detailed design drawings, technical information, calculations and manufacturers' literature.
3. Conductor sizes (minimum)
  - 3.1. Lighting circuits: 1.5 mm<sup>2</sup>.
  - 3.2. Final connection: 1.5 mm<sup>2</sup>.
4. Cable sizes not stated: Submit.

#### **Conduit, trunking and ducting generally**

1. Standard: In accordance with [BS 7671](#).
2. Requirement: Submit proposals, including detailed design drawings, technical information, calculations and manufacturers' literature.
3. Conduit, trunking and ducting sizes not stated: Submit.

### **Products**

#### **Electrical diagrams Type A**

1. Material: Engraved plastics laminate.

2. **Format:** Single line engineering drawings to [BS EN 61082-1](#).
3. **Information to be included:** Supply characteristics. Maximum demand. Switchgear ratings. Protective device types, ratings and function. Prospective fault current values at each item of switchgear. Circuits containing equipment vulnerable to testing.
4. **Size:** A1.

### **Externally illuminated emergency exit signs**

1. **Graphical symbol format:** To [BS ISO 3864-4](#) and [BS EN ISO 7010](#).

### **Cable trays Type A**

1. **Standard:** To [BS EN 61537](#).
2. **Material:** Metal.
3. **Resistance against flame propagation:** Non-flame-propagating.
4. **Electrical properties**
  - 4.1. **Continuity characteristics:** Without electrical continuity.
  - 4.2. **Conductivity characteristics:** Without electrical conductive system component.
5. **Coating material:** Powder coating.
6. **Temperature properties for transport, storage, installation and application**
  - 6.1. **Minimum:** 5°C.
  - 6.2. **Maximum:** 60°C.
7. **Mechanical properties**
  - 7.1. **Cable tray free base area:** Class X.
  - 7.2. **Resistance to impact:** Up to 10 J.
8. **Width:** As indicated in bills of quantities
9. **Features**
  - 9.1. **Flange type:** Plain.
  - 9.2. **Segregation:** Not required.
  - 9.3. **Protective cover:** Not required.
10. **Execution:** [Installing cable tray and cable ladder Type B](#)

### **Light-duty PVC-insulated and sheathed flexible cables**

1. **Standards:** To [BS EN 50525-1](#) and [BS EN 50525-2-11](#).
2. **Cable type:** H03VVH2-F.
3. **Sheath colour:** Black.
4. **Reaction to fire class**
  - 4.1. **Fire behaviour:** C<sub>ca</sub>.
  - 4.2. **Additional classification for smoke production:** s1.
  - 4.3. **Additional classification for flaming droplets and/ or particles:** d1.
5. **Execution:** [Installing flexible cables](#)

### **PVC-insulated and sheathed cables**

1. **Standard:** To [BS 6004](#).
2. **Sheath colour:** Grey.
3. **Reaction to fire class**
  - 3.1. **Fire behaviour:** C<sub>ca</sub>.
  - 3.2. **Additional classification for smoke production:** s1.



3.3. Additional classification for flaming droplets and/ or particles: d1.

4. Execution: [Installing low-voltage cables Type D](#)

### **Dimmer switches and controls**

1. Standards: To [BS EN 60669-1](#) and [BS EN 60669-2-1](#).
2. Rated load: 500 W per gang.
3. Arrangement: Single gang.
4. Actuating method: Touch screen.
5. Control functions: Dim up and down.
6. Suitable for the following loads: Declared load.
7. Mounting: Flush.
8. Cable termination: Screwless for rigid and flexible conductors.
9. Plate
  - 9.1. Material: Aluminium.
  - 9.2. Finish: Polished.
10. Execution: [Installing light switches](#)

### **Plate switches**

1. Standard: To [BS EN 60669-1](#).
2. Current rating: 10 A.
3. Actuating method: Rotary switch.
4. Poles: Double pole.
5. Arrangement: As indicated in the bills of quantities
6. Mounting: Flush.
7. Ingress protection (minimum): To [BS EN 60529](#), IP 44.
8. Cable termination: Screwless for rigid and flexible conductors.
9. Plate
  - 9.1. Material: Brass.
  - 9.2. Finish: Polished.
10. Execution: [Installing light switches Type A](#)

### **Self-ballasted LED lamps**

1. Standards: To [BS EN 62560](#) and [BS EN 62612](#).
2. Third-party certification: [BSI Kitemark](#)-approved.
3. Cap type: E27.
4. Wattage: As indicated in the bills of quantities
5. Colour temperature: 3500 K.
6. Colour rendering index (Ra): >90.
7. Rated life (minimum): 10000 hours
8. Initial lumens (minimum): As indicated in drawings
9. Energy efficiency label: A++.
10. Dimmable: Yes.

### **Emergency luminaires**

1. Standards: To [BS EN 60598-1](#), [BS 4533-102-1](#) and [BS EN 60598-2-22](#).
2. Third-party certification: [ENEC](#) mark.

3. Luminaire description: As indicated in the drawings
4. Classification
  - 4.1. Electric shock: To [BS EN 60598-1](#), Class II.
  - 4.2. Ingress protection (minimum): To [BS EN 60529](#), IP54.
  - 4.3. Suitability for direct mounting on normally flammable surfaces: Suitable for direct mounting on normally flammable surfaces.
  - 4.4. Circumstances of use: Normal.
  - 4.5. Type: X.
  - 4.6. Mode of operation: 3.
  - 4.7. Facilities: G.
  - 4.8. Duration of emergency mode (minimum): 180.
5. Rated maximum ambient temperature: 30 degrees celsius
6. Impact protection (minimum): IK10.
7. Luminaire performance: To [BS EN 62722-1](#) and [BS EN 13032-1](#).
8. Controlgear position: Integral within luminaire.
9. Supply circuit conductor connections: Screw terminals.
10. Internal fuse: Required for incoming circuit phase connections.
11. Nominal voltage: 230 V a.c..
12. Luminaire power factor: Correct to minimum 0.9 lagging.
13. LED luminaires
  - 13.1. Performance standards: To [BS EN 62717](#) and [BS EN 62722-2-1](#).
  - 13.2. Safety standard: To [BS EN IEC 62031](#).
  - 13.3. Wattage: As indicated in the bills of quantities
  - 13.4. Colour temperature: 3500 K.
  - 13.5. Colour rendering index (Ra): >90.
  - 13.6. Useful life: 10000 hours
14. Non-LED luminaires
  - 14.1. Ballasts' CELMA energy efficiency index (minimum): A2.
  - 14.2. Number of lamps: As indicated in the bills of quantities
  - 14.3. Lamp properties
    - 14.3.1. Wattage: As indicated in the bills of quantities
    - 14.3.2. Colour temperature: 3500 K.
    - 14.3.3. Colour rendering index (Ra): >90.
    - 14.3.4. Initial lumens (minimum): As indicated in the bills of quantities
15. Graphical symbol format: To [BS EN ISO 7010](#), (E002 emergency exit right hand).
16. Accessories: Brushed brass bezel.
17. Execution: Luminaire samples; Installing luminaires and lamps generally

### **Recessed luminaires**

1. Standards: To [BS 4533-102-19](#).
2. Third-party certification: [ENEC+](#) mark.
3. Luminaire description: As indicated in the bills of quantities
4. Classification

- 4.1. Electric shock: To [BS EN 60598-1](#), Class II.
- 4.2. Ingress protection (minimum): To [BS EN 60529](#), IP23.
- 4.3. Suitability for direct mounting on normally flammable surfaces: Not suitable for direct mounting on normally flammable surfaces.
- 4.4. Circumstances of use: Normal.
- 5. Rated maximum ambient temperature: 30 degrees celsius
- 6. Luminaire performance: To [BS EN 62722-1](#) and [BS EN 13032-1](#).
- 7. Controlgear position: Integral within luminaire.
- 8. Supply circuit conductor connections: Screwless terminals.
- 9. Internal fuse: Required for incoming circuit phase connections.
- 10. Nominal voltage: 230 V a.c..
- 11. Luminaire power factor: Correct to minimum 0.9 lagging.
- 12. LED luminaires
  - 12.1. Performance standards: To [BS EN 62717](#) and [BS EN 62722-2-1](#).
  - 12.2. Safety standard: To [BS EN IEC 62031](#).
  - 12.3. Initial LED luminaire efficacy (minimum): As indicated in the bills of quantities
  - 12.4. Wattage: As indicated in the bills of quantities
  - 12.5. Colour temperature: As indicated in the bills of quantities
  - 12.6. Colour rendering index (Ra): As indicated in the bills of quantities
  - 12.7. Useful life: 10000 hours
- 13. Non-LED luminaires
  - 13.1. Ballasts' CELMA energy efficiency index (minimum): A2.
  - 13.2. Number of lamps: As indicated in the bills of quantities
  - 13.3. Lamp properties
    - 13.3.1. Wattage: As indicated in the bills of quantities
    - 13.3.2. Colour temperature: As indicated in the bills of quantities
    - 13.3.3. Colour rendering index (Ra): As indicated in the bills of quantities
- 14. Dimming protocol: DALI.
- 15. Emergency version
  - 15.1. Standard: To [BS EN 60598-2-22](#).
  - 15.2. Classification
    - 15.2.1. Type: X.
    - 15.2.2. Mode of operation: 0.
- 16. Accessories: Integral photocell. Integral presence detector.
- 17. Execution: Luminaire samples Type A; Luminaires mounted as part of a suspended ceiling; Installing luminaire supports; Installing luminaires and lamps generally Type A

### **Surface luminaires**

- 1. Standard: To [BS EN 60598-1](#) and [BS 4533-102-1](#).
- 2. Luminaire description: As indicated in the bills of quantities
- 3. Classification
  - 3.1. Electric shock: To [BS EN 60598-1](#), Class II.
  - 3.2. Ingress protection (minimum): To [BS EN 60529](#), IP23.

- 3.3. Suitability for direct mounting on normally flammable surfaces: Not suitable for direct mounting on normally flammable surfaces.
- 3.4. Circumstances of use: Normal.
- 4. Rated maximum ambient temperature: 30 degrees celsius
- 5. Impact protection (minimum): IK06.
- 6. Luminaire performance: To [BS EN 62722-1](#) and [BS EN 13032-1](#).
- 7. Controlgear position: Integral within luminaire.
- 8. Supply circuit conductor connections: Screw terminals.
- 9. Internal fuse: Not required.
- 10. Nominal voltage: 230 V a.c..
- 11. Luminaire power factor: Correct to minimum 0.9 lagging.
- 12. LED luminaires
  - 12.1. Performance standards: To [BS EN 62717](#) and [BS EN 62722-2-1](#).
  - 12.2. Safety standard: To [BS EN IEC 62031](#).
  - 12.3. Wattage: As indicated in the bills of quantities
  - 12.4. Colour temperature: 3500 K.
  - 12.5. Colour rendering index (Ra): >90.
  - 12.6. Useful life: 10000 hours
- 13. Non-LED luminaires
  - 13.1. Ballasts' CELMA energy efficiency index (minimum): A2.
  - 13.2. Number of lamps: As indicated in the bills of quantities
  - 13.3. Lamp properties
    - 13.3.1. Wattage: As indicated in the bills of quantities
    - 13.3.2. Colour temperature: 3500 K.
    - 13.3.3. Colour rendering index (Ra): >90.
- 14. Dimming protocol: DALI.
- 15. Emergency version
  - 15.1. Standard: To [BS EN 60598-2-22](#).
  - 15.2. Classification
    - 15.2.1. Type: X.
    - 15.2.2. Mode of operation: 0.
- 16. Execution: Installing luminaires and lamps generally Type B

### **Suspended luminaires**

- 1. Standards: To [BS EN 60598-1](#) and [BS 4533-102-1](#).
- 2. Third-party certification: [ENEC+](#) mark.
- 3. Classification
  - 3.1. Electric shock: To [BS EN 60598-1](#), Class II.
  - 3.2. Ingress protection (minimum): To [BS EN 60529](#), IP23.
  - 3.3. Suitability for direct mounting on normally flammable surfaces: Not suitable for direct mounting on normally flammable surfaces.
  - 3.4. Circumstances of use: Normal.
- 4. Rated maximum ambient temperature: 30 degrees Celsius

5. Impact protection (minimum): IK05.
6. Luminaire performance: To [BS EN 62722-1](#) and [BS EN 13032-1](#).
7. Controlgear position: Integral within luminaire.
8. Supply circuit conductor connections: Screw terminals.
9. Internal fuse: Required for incoming circuit phase connections.
10. Nominal voltage: 230 V a.c..
11. Luminaire power factor: Correct to minimum 0.9 lagging.
12. LED luminaires
  - 12.1. Performance standards: To [BS EN 62717](#) and [BS EN 62722-2-1](#).
  - 12.2. Safety standard: To [BS EN IEC 62031](#).
  - 12.3. Initial LED luminaire efficacy (minimum): As indicated in the bills of quantities
  - 12.4. Wattage: As indicated in the bills of quantities
  - 12.5. Colour temperature: 3500 K.
  - 12.6. Colour rendering index (Ra): >90.
  - 12.7. Useful life: 10000 hours
13. Non-LED luminaires
  - 13.1. Ballasts' CELMA energy efficiency index (minimum): A2.
  - 13.2. Number of lamps: As indicated in the bills of quantities
  - 13.3. Lamp properties
    - 13.3.1. Wattage: As indicated in the bills of quantities
    - 13.3.2. Colour temperature: 3500 K.
    - 13.3.3. Colour rendering index (Ra): >90.
    - 13.3.4. Initial lumens (minimum): As indicated in the bills of quantities
14. Dimming protocol: DALI.
15. Emergency version
  - 15.1. Standard: To [BS EN 60598-2-22](#).
  - 15.2. Classification
    - 15.2.1. Type: X.
    - 15.2.2. Mode of operation: 0.
    - 15.2.3. Facilities: G.
    - 15.2.4. Duration of emergency mode (minimum): 60.
16. Accessories:
17. Execution: Installing luminaires and lamps generally Type C

### **Occupancy detectors**

1. Standards: To [BS EN 60669-1](#) and [BS EN 60669-2-1](#).
2. Sensor type: Passive infrared.
3. Nominal voltage: 230 V a.c.
4. Rated current: 10 A.
5. Detection method: Presence.
6. Occupancy sensitivity: Adjustable.
7. Range: 15 Meters at 3 Meters mounting Height
8. Field of view: 360 degrees

9. **Switching delay:** Adjustable.
10. **Remote setup/ override:** By infrared controller.
11. **Mounting:** Ceiling.
12. **Ingress protection (minimum):** To [BS EN 60529](#), IP44.
13. **Equipment interconnectivity**
  - 13.1. **Wired:** Required.
  - 13.2. **Radio-based**
    - 13.2.1. **Communications protocol:** ZigBee.
    - 13.2.2. **Sensor power supply:** Integral battery.
    - 13.2.3. **Battery life (minimum):** Five years.
14. **Execution:** [Installing occupancy detectors](#)

## **Execution**

### **Installing cable tray and cable ladder Type B**

1. **Standards:** In accordance with [BS 7671](#) and [IET Guidance Note 1](#).
2. **Preparation**
  - 2.1. **Burrs and sharp edges:** Make smooth.
  - 2.2. **Cutting:** Minimize and make good edges. Cuts to cable tray to be square along an unperforated line.
  - 2.3. **Treatment of cut surface:** Extend 25 mm beyond the cut. Match finish of cable supports.
3. **Access:** Provide space around cable ladder and tray to permit access for installing and maintaining cables.
4. **Joints and expansion couplers**
  - 4.1. **Position:** Locate between the bracket support and the quarter point.
  - 4.2. **Number of joints:** Minimize.
  - 4.3. **Lengths of cable ladder and tray:** Maximize.
  - 4.4. **Ends:** Blank with end plates.
5. **Changes of size and direction:** Manufacturer's accessories of the same material type, pattern, finish and thickness as cable supports.
6. **Fire barriers:** Provide where required to maintain fire performance of fabric.
7. **Protective covers:** Provide to cables requiring mechanical protection.
8. **Support**
  - 8.1. **Fixing arrangement:** Independently fix and support from building structure using threaded rod fixed into expanding anchors.
  - 8.2. **Clearance from building fabric (minimum):** 20 mm.
9. **Components:** Avoid contact between dissimilar metals.
10. **Routing of cable ladder and tray:** Submit drawings showing the proposed routes of cable ladder and cable tray.

### **Installing low-voltage cables Type D**

1. **Standard:** In accordance with [BS 7671](#).
2. **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.

3. **Preparation:** Store cables above 5°C for 24 hours before installation.

Clear cable path of debris.

4. **Installation temperature (minimum):** 5°C.
5. **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
6. **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
7. **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
8. **Concealed cable runs to wall accessories:** Run vertically from the accessory.
9. **Exposed cable runs:** Minimum 25 mm between cable face and structure.
10. **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
11. **Jointing and termination**
  - 11.1. **Final circuit cables:** At electrical accessories only.
  - 11.2. **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - 11.3. **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### **Installing flexible cables**

1. **General requirements:**
2. **Cables:** Grip securely at connections. Where cord grips do not form an integral part of the accessory or equipment, provide separate proprietary cord grips.

### **Installing light switches**

1. **Multigang switches:** Connect so that there is a logical relationship with luminaire positions.
2. **Unused switch spaces:** Fit with blanks.
3. **Segregation:** Internally segregate each phase with phase barriers. Include warning plates.

### **Installing light switches Type A**

1. **Multigang switches:** Connect so that there is a logical relationship with luminaire positions.
2. **Unused switch spaces:** Fit with blanks.
3. **Segregation:** Internally segregate each phase with phase barriers. Include warning plates.

### **Luminaire samples**

1. **Submittals:** Include manufacturer's technical information with each sample.
2. **Identification:** Label samples with the luminaire references.

### **Luminaire samples Type A**

1. **Submittals:** Include manufacturer's technical information with each sample.
2. **Identification:** Label samples with the luminaire references.

### **Installing luminaires and lamps generally**

1. **Lamps and accessories:** Provide.
2. **Supports:** Adequate for weight of luminaire.

### **Installing luminaires and lamps generally Type A**

1. Lamps and accessories: Provide.
2. Supports: Adequate for weight of luminaire.

### **Installing luminaires and lamps generally Type B**

1. Lamps and accessories: Provide.
2. Supports: Adequate for weight of luminaire.

### **Installing luminaires and lamps generally Type C**

1. Lamps and accessories: Provide.
2. Supports: Adequate for weight of luminaire.

### **Luminaires mounted as part of a suspended ceiling**

1. Luminaire supports: Independent suspension wires.
2. Luminaire final connection: Luminaire supporting couplers.
3. Mounting arrangement: From cable connection on side of trunking.
4. Length (maximum): 4 m.

### **Installing luminaire supports**

1. Support and fixing arrangement: Vertical
2. Luminaire suspensions: Vertical.
3. Multiple suspensions: Provide as necessary.
4. Levelling: Adjust the length of suspensions so that luminaires are level.
5. Levelling tolerance:  $\pm 3$  mm.
6. Conduit supports
  - 6.1. Size (minimum): 20 mm.
  - 6.2. Type: Match cable containment.
7. Conduit boxes: Provide for each luminaire suspension point.
8. Rod supports: Continuously threaded rods.
9. Chain supports: Steel chain with conduit box hook and cover.
10. Ball and socket: Provide as top support and fix cover to circular conduit box. Route cable from conduit box through ball and socket.
11. Number of supports for luminaires longer than 600 mm (minimum)
  - 11.1. Luminaire width <300 mm: Two.
  - 11.2. Luminaire width >300 mm: Four.

### **Installing control components**

1. Standard: In accordance with [BS 7671](#).
2. Equipment and sensor identification labels: Provide.
3. Insulation: Submit details of proposed insulation method where control components are on insulated pipelines.
4. Supports: Do not strain components.
5. Access: Adequate for operation and maintenance.

### **Installing occupancy detectors**

1. General requirements: [Installing control components](#)
2. Position: Ceiling-mounted, located to suit the occupancy pattern of the area under control and shielded from erroneous influences.
3. Interconnection: To luminaire.



4. **Cable type:** PVC-insulated and sheathed cables.
5. **Cable containment:** Flexible conduit.
6. **Light level sensor:** Set each detector to the specified lux level as specified on room data sheets.

### **Installing emergency lighting systems**

1. **Standards:** In accordance with [BS 5266-1](#) and [BS 7671](#).
2. **Connection of luminaire supporting couplers**
  - 2.1. **Emergency luminaires:** Red plug with red cover.
  - 2.2. **Flex length (maximum):**
3. **Permanent electrical supplies to self-contained emergency luminaires:** Derive from the closest general lighting circuit.

### **System completion**

#### **Testing and commissioning of general lighting systems**

1. **Standards:** In accordance with [BS 7671](#) and [CIBSE Commissioning Code L](#).
2. **Test results:** Submit two copies of system commissioning completion certificate.
3. **Certificates of calibration for meters and instruments:** Submit.

## Card access control systems

### Systems

#### Card access control systems

1. System performance: [Design of electronic access control systems](#); [Connection to fire detection and alarm systems](#)
2. System type: Networked.
3. Equipment interconnectivity: Wired.
4. Control software: Resident on site server.
5. Method of authorization: Biometric credentials.
6. Readers: [Biometric fingerprint readers](#)
7. Locking mechanisms: [Magnetic locks](#)
8. Controls: [Access control units](#)
9. Door status monitoring: [Door status monitoring devices](#)
10. Cable type: [Multicore alarm cables](#)
11. Containment: [Cable baskets](#)
12. Rewireable installation: Required.
13. Concealed installation: Required.
14. System accessories: [Digital cameras](#)
15. Execution: [Installing electronic access control systems](#); [Equipment labelling and system diagrams](#)
16. System completion: [Testing and commissioning electronic access control systems](#)

### System performance

#### Design of electronic access control systems

1. Design: Complete the design of the electronic access control system.
2. Requirement: Submit proposals including detailed design drawings, technical information, calculations and manufacturers' literature.
3. Standards: [BS EN 60839-11-1](#) and [BS EN 60839-11-2](#).
4. Security grading: To [BS EN 60839-11-1](#), Grade 4.
5. Environmental classification: To [BS EN 60839-11-1](#), Class I.
6. Number of users (minimum): 100.
7. Number of transactions (minimum): 100 per 24 hour.
8. Spare capacity: Required.
9. Database
  - 9.1. Redundancy: Required.
  - 9.2. Backup arrangements: Automatic.
10. Operation in the event of mains failure: Access points open.
11. Anti-passback: Logical.
12. Functional requirements: Multi-credential usage.

#### Connection to fire detection and alarm systems

1. Operation in the event of a fire signal: Access points open.

## **Products**

### **Cable baskets**

1. Standard: To [BS EN 61537](#).
2. Material: 3 mm steel wire.
3. Coating material: Powder coating.
4. Features
  - 4.1. Segregation: Not required.
5. Execution: [Installing cable basket](#)

### **Multicore alarm cables**

1. Standard: To [BS 4737-3-30](#).
2. Cable type: 1
3. Conductor
  - 3.1. Number of cores: Four.
  - 3.2. Type: Stranded.
  - 3.3. Sheath: LSHF.
  - 3.4. Screen: Aluminium foil screen with tinned copper drain wire.
4. Reaction to fire class
  - 4.1. Fire behaviour: B1<sub>ca</sub>.
  - 4.2. Additional classification for smoke production: s1b.
  - 4.3. Additional classification for flaming droplets and/ or particles: d1.
  - 4.4. Additional classification for acidity: a1.
5. Execution: [Installing low-voltage cables](#)

### **Magnetic locks**

1. Standard: To [BS EN 13637](#), when used on escape routes.
2. Rated operational voltage (U<sub>e</sub>): 24 V d.c.
3. Operation in the event of mains failure: Fail unlocked.
4. Monitoring: Individual LEDs indicating door secure and door unlocked.
5. Features: Anti-tamper.
6. Material and finish: Brushed aluminium.
7. Instant release circuit: Required.

### **Digital cameras**

1. Effective pixels: 12 million.
2. Lens
  - 2.1. Focal length: 7.5–20 mm.
  - 2.2. Zoom: x3 optical.
3. Features: Auto exposure.
4. Integral flash: 0.5–8 m range.
5. Battery type: Rechargeable Li-ion battery with mains charger.
6. Image file format: JPEG.
7. Connectivity: Universal serial bus (USB).
8. Tripod: Required.

## **Access control units**

1. Standards: To [BS EN 60839-11-1](#) and [BS EN 60839-11-2](#).
2. Security grading: To [BS EN 60839-11-1](#), Grade 3.
3. Environmental classification: To [BS EN 60839-11-1](#), Class II.
4. Type of operation: Networked.
5. Number of doors per controller: As per bills of quantities
6. Number of users (minimum): 300.
7. Communication interface: RS-485.
8. Visual indication: Status LEDs.
9. Interfaces
  - 9.1. Door lock relays: As per bills of quantities
  - 9.2. Door status monitoring: As per bills of quantities
  - 9.3. Readers: as per bills of quantities
  - 9.4. Request to exit buttons: As per bills of quantities
10. Data encryption: 256 bit.
11. Random access memory (RAM) capacity (minimum): 512 MB.
12. Administration access: Password protected.
13. Database: ODBC compatible.
14. Information fields per user: Access period. Access points. Department. Email address. First name. Holiday schedule. Last name. Photograph. Telephone. Token expiry. Token number. Visitor status.
15. Spare information fields per user (minimum): 10.
16. Import and export of database in ASCII format: Required.
17. Incorporation of external data: Incorporate system symbols into system graphics.
18. Monitor and record the following transactions and events: Forced access. Pass back attempt. Tamper. Transaction invalid. Transaction timed out. Transaction valid.
19. Events and transactions: Data and time stamp.
20. Customised event alarms: Display.
21. Control features
  - 21.1. Include the following: Access point status monitoring. Auto unlock at predefined times. User-configurable access groups, grids and levels. User-configurable access point, unlock time. User-configurable access point, unlock time. User-configurable time grids, zones and slots. Daylight time saving. Display access point status on site and layout plans. Security lockdown.
  - 21.2. Anti-passback: Global.
  - 21.3. Time between credential presentation and door unlock (maximum): 0.3 seconds.
22. Reports
  - 22.1. Transaction and event reports: By access point.
  - 22.2. Other reports: Building occupancy.
23. Publishing: Export to pdf.
24. Accessories: USB port.
25. Execution: [Installing access control units](#)

## **Biometric fingerprint readers**

1. Security grading: To [BS EN 60839-11-1](#), Grade 3.
2. Environmental classification: To [BS EN 60839-11-1](#), Class II.
3. Material and finish: ABS plastic.
4. Power supply: 24 V d.c.
5. Type of operation: Networked.
6. Communication interface: RS-485.
7. Number of users (minimum): 500.
8. Fingerprint capture: Optical image.
9. Image resolution (minimum): 500 dpi.
10. Credential matching arrangement: Pattern matching.
11. False acceptance rate: 0.1%.
12. False rejection rate: 0.1%.
13. Fingerprints for each user: One.
14. Identification time per 100 fingerprint templates (maximum): 1 s.
15. Integral keypad: Not required.
16. Integral credential reader: Not required.
17. Integral event memory capacity (minimum): 50 000.
18. Remote door opening: Required.
19. Visual indication: Multi-coloured LED displaying red when access point status secure, green when unlocked.
20. Audio status indication: Required.
21. Execution: [Installing keypads and readers](#)

## **Door status monitoring devices**

1. Security grading: To [BS EN 60839-11-1](#), Grade 3.
2. Environmental classification: To [BS EN 60839-11-1](#), Class II.
3. Device type: Magnetic reed switch.
4. Mounting: Surface.

## **Execution**

### **Installing cable basket**

1. Standards: In accordance with [BS 7671](#) and [IET Guidance Note 1](#).
2. Joints: Cut adjacent cross basket wires. Make smooth any burrs or edges.
3. Accessories: Form on site and connect with basket manufacturer's coupling components.
4. Fire barriers: Provide where required to maintain fire performance of fabric.
5. Support
  - 5.1. Fixing arrangement: Independently fix and support from building structure using threaded rod fixed to channel cable support with shake proof washers and hex nuts.
  - 5.2. Clearance from building fabric (minimum): 20 mm.
6. Components: Avoid contact between dissimilar metals.
7. Routing of cable basket: Submit drawings showing the proposed routes.

## **Installing low-voltage cables**

1. **Standard:** In accordance with [BS 7671](#).
2. **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
3. **Preparation:** Store cables above 5°C for 24 hours before installation.

Clear cable path of debris.

4. **Installation temperature (minimum):** 5°C.
5. **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
6. **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
7. **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
8. **Concealed cable runs to wall accessories:** Run vertically from the accessory.
9. **Exposed cable runs:**
10. **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
11. **Jointing and termination**
  - 11.1. **Final circuit cables:** At electrical accessories only.
  - 11.2. **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - 11.3. **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

## **Installing keypads and readers**

1. **Mounting**
  - 1.1. **Mounting position:** Install the reader on the wall within 200 mm of the latch edge of the door.
  - 1.2. **Mounting arrangement:** Surface.
  - 1.3. **Height (finished floor level to underside of equipment):** 900 mm.
2. **Administration reader:** Install adjacent to the access controller or PC administering the software to allow registration of users.

## **Installing access control units**

1. **Mounting position:** Ensure that controllers are fixed securely and allow clear access for cabling.

## **Installing electronic access control systems**

1. **Standards:** To [BS EN 60839-11-1](#) and [BS EN 60839-11-2](#).
2. **Installing cabling**
  - 2.1. **Standard:** In accordance with [BS 7671](#).
  - 2.2. **Routes:** As per drawings
  - 2.3. **Security measures:** Suitably protect all cabling from inadvertent damage or tampering to avoid compromising the security of the system.

## **Equipment labelling and system diagrams**

1. **Access points and door controllers:** Label with a unique identification code.
2. **System diagram:** Provide showing the location and identity of all system equipment.

3. **Position:** Next to the electronic access system controller.

## **System completion**

### **Testing and commissioning electronic access control systems**

1. **Standards:** To [BS EN 60839-11-1](#) and [BS EN 60839-11-2](#).
2. **System commissioning agent:** System manufacturer.
3. **Notice before commencing tests (minimum):** 7 d.
4. **System programming:** Configure user database and credentials.
5. **Cable testing**
  - 5.1. **Insulation resistance:** Submit results.
  - 5.2. **Earth continuity:** Submit results.
6. **Access points:** Verify the correct operation of readers, across each access level. Check alignment of lock mechanism. Configure unlock times.
7. **Standby supply:** Verify operation in the event of a mains failure. Check capacity and submit results Verify operation of battery charger.
8. **Equipment tamper detection:** Verify operation.

## **Surveillance CCTV systems**

### **Systems**

#### **Surveillance CCTV systems**

1. System performance: Design of CCTV systems; Operational requirements; Remote monitoring; Integration with other alarm and security systems; Video motion detection software
2. Automatic activation of cameras: Via video motion detection software.
3. Surveillance equipment: Fixed dome cameras; Bullet cameras
4. Control equipment: Surveillance monitors Type A; Video matrix switch controllers Type A
5. Data storage: Network video recorders Type A
6. Cable type: Balanced twisted-pair cables Type A
7. Containment: Cable trays
8. Rewireable installation: Required.
9. Concealed installation: Required.
10. System accessories: Surveillance system signs
11. Execution: Installing closed-circuit television systems; Installing signage
12. System completion: Closed-circuit television system testing and commissioning; Training; Documentation

### **System performance**

#### **Design of CCTV systems**

1. Design: Complete the design of the CCTV system.
2. Standards: In accordance with [BS 8418](#).
3. System type: Internet protocol (IP).
4. Security grading: To [BS EN 62676-1-1](#), Grade 3.
5. Requirement: Submit proposals, including positions of cameras (including field of view), detectors (including range and coverage), areas designated for parking, control rooms, power supplies and interconnections. Include technical information, calculations and manufacturers' literature.

#### **Operational requirements**

1. Standard: In accordance with [BS EN 62676-4](#).
2. Objectives: Access control. Anti-social behaviour. Public safety. Property protection. Safety. Site surveillance. Theft. Unauthorized entry. Vandalism.
3. Activity to be captured: Observe the actions of a group or crowd of people. Recognize known individuals at an entrance. Identify unfamiliar person(s).
4. Period of operation: All days
5. Image monitoring: By personnel
6. Image storage: 90 days storage

#### **Remote monitoring**

1. Standard: In accordance with [BS 8418](#).
2. Audio challenge facility: Required.

#### **Integration with other alarm and security systems**

1. Systems to be integrated: Access control systems. Intruder detection and hold-up alarm systems. Fire detection and alarm systems.

#### **Video motion detection software**

1. Operating system: Windows 10



2. **Functions:** User definable areas of interest and masking. Motion detection. Object detection. People counting. Recognition. Tamper detection. Video tracking.

## **Products**

### **Surveillance system signs**

1. **Material:** Aluminium.
2. **Format:** Yellow background with black text and images.
3. **Content:** Warn individuals that they are entering premises or an area with CCTV surveillance. CCTV camera symbol. Describe the purpose of the CCTV system. Identify the organization responsible for operating the system and their contact details.

### **Network video recorders Type A**

1. **Video compression formats:** H.265.
2. **Bandwidth (minimum):** 80Mbps
3. **Recording speed and resolution:** As indicated in the bills of quantities
4. **Recording mode:** Motion detection configurable for each camera. Support simultaneous viewing, playback, recording, and exporting video at full frame rate and resolution. Alarm input.
5. **Digital watermarking:** Apply at point of recording and include time and date.
6. **Playback function:** Fast forward x2, x8, x16, x32. Fast reverse x2, x8, x16, x32. Slow motion x1/2, x1/4. Manual, scheduled and alarm video recordings to be played back while other recordings continue. Frame by frame. Pause.
7. **Video search function:** Event. Time and date.
8. **Video inputs:** As per bills of quantities
9. **Video outputs:** HDMI and VGA
10. **Audio inputs:** One via BNC
11. **Alarms:** Four In, Four Out
12. **Screen display**
  - 12.1. **Window arrangement:** 8
  - 12.2. **Display the following information:** 15 character title. Current date and time for live images. Frame rate received and displayed. Recorded data and time for play back images. Recording status, playback status and speed. Total available recording time available.
13. **Display resolution (minimum):** As per bills of quantities
14. **Storage media**
  - 14.1. **Type:** Dual hard disk.
  - 14.2. **Capacity:** As per bills of quantities
15. **Network connectivity:** 10/100 base T via RJ45.
16. **Network protocols:** As per bills of quantities
17. **Video backup:** Integral DVD writer. USB.
18. **Telemetry protocol:** Manufacturer Protocol
19. **Power supply:** 230 V a.c.
20. **Mounting:** Rack.
21. **Execution:** *Installing video recorders*

### **Bullet cameras**

1. **Image sensor:** As indicated in bills of quantities
2. **Video system:** PAL.

3. Spectrum: Colour.
4. Resolution (minimum): As indicated in bills of quantities
5. Minimum illumination: As indicated in bills of quantities
6. Integrated illumination: Infrared.
7. Camera functions
  - 7.1. Focus: As indicated in bills of quantities
  - 7.2. Shutter: As indicated in bills of quantities
  - 7.3. Signal to noise ratio (minimum): 50 dB with automatic gain control off.
  - 7.4. Automatic gain control: Automatic.
  - 7.5. White balance control: Automatic.
  - 7.6. Backlight compensation: Required.
  - 7.7. Wide dynamic range: On/ Off/ Automatic.
  - 7.8. Day/ night mode switching: Automatic at pre-determined threshold (25 lx).
  - 7.9. Audio facility: Integral one way.
  - 7.10. Display type: On camera multi-language, menu-driven screen display allowing full configuration of camera and through remote monitor and keyboard.
8. Lens
  - 8.1. Format: Varifocal.
  - 8.2. Focal length: As indicated in bills of quantities
  - 8.3. Aperture range: As indicated in bills of quantities
  - 8.4. Angle of view: As indicated in bills of quantities
9. Video motion detection: Required
10. Power supply: 24 V a.c.
11. Telemetry protocol: required
12. Network connectivity: 10/100BASE-T via RJ-45.
13. Network protocols: IP
14. Video compression formats: H.265.
15. Video streaming: Quad.
16. Integral memory storage (minimum): 16 GB.
17. Camera housing
  - 17.1. Ingress protection (minimum): To [BS EN 60529](#), IP66.
  - 17.2. Impact protection (minimum): To [BS EN 62262](#), IK10.
  - 17.3. Environmental classification: To [BS EN 62676-1-1](#), Class III.
18. Execution: [Installing CCTV cameras](#)

### **Fixed dome cameras**

1. Image sensor: As indicated in bills of quantities
2. Video system: PAL.
3. Spectrum: Colour.
4. Resolution (minimum): As indicated in bills of quantities
5. Minimum illumination: As indicated in bills of quantities
6. Integrated illumination: Infrared.
7. Camera functions

- 7.1. Focus: Automatic.
  - 7.2. Shutter: Automatic.
  - 7.3. Signal to noise ratio (minimum): 50 dB with automatic gain control off.
  - 7.4. Automatic gain control: Automatic.
  - 7.5. White balance control: Automatic.
  - 7.6. Backlight compensation: Required.
  - 7.7. Wide dynamic range: On/ Off/ Automatic.
  - 7.8. Day/ night mode switching: Automatic at pre-determined threshold (25 lx).
  - 7.9. Audio facility: Integral one way.
  - 7.10. Display type: On camera multi-language, menu-driven screen display allowing full configuration of camera and through remote monitor and keyboard.
- 8. Lens
    - 8.1. Format: Varifocal.
    - 8.2. Iris: Automatic, d.c. drive.
    - 8.3. Focal length: As indicated in bills of quantities
    - 8.4. Aperture range: As indicated in bills of quantities
    - 8.5. Angle of view: As indicated in bills of quantities
  - 9. Video motion detection: Required.
  - 10. Power supply: 24 V a.c.
  - 11. Telemetry protocol: required
  - 12. Network connectivity: 10/100BASE-T via RJ-45.
  - 13. Network protocols: IP
  - 14. Video compression formats: H.265.
  - 15. Video streaming: Quad.
  - 16. Integral memory storage (minimum): 16 GB.
  - 17. Camera housing
    - 17.1. Ingress protection (minimum): To [BS EN 60529](#), IP66.
    - 17.2. Impact protection (minimum): To [BS EN 62262](#), IK10.
    - 17.3. Environmental classification: To [BS EN 62676-1-1](#), Class III.
    - 17.4. Dome colour: Transparent.
  - 18. Accessories: Ceiling bracket.
  - 19. Execution: [Installing CCTV cameras Type A](#)

### **Surveillance monitors Type A**

- 1. Third party certification: [BEAB](#).
- 2. Monitor type: Liquid crystal display (LCD).
- 3. Size (nominal diagonal): 21 inch.
- 4. Video system: PAL.
- 5. Resolution (minimum): 1920 x 1080.
- 6. Response time (maximum): 5 ms.
- 7. Video inputs: HDMI.
- 8. Audio inputs: RCA.
- 9. Mounting: Desk.
- 10. Accessories: Wall mounting bracket.

## 11. Execution: Installing CCTV monitors

### **Cable trays**

1. Standard: To [BS EN 61537](#).
2. Material: Metal.
3. Resistance against flame propagation: Non-flame-propagating.
4. Electrical properties
  - 4.1. Continuity characteristics: Without electrical continuity.
  - 4.2. Conductivity characteristics: Without electrical conductive system component.
5. Coating material: Powder coating.
6. Temperature properties for transport, storage, installation and application
  - 6.1. Minimum: 5°C.
  - 6.2. Maximum: 40°C.
7. Mechanical properties
  - 7.1. Cable tray free base area: Class X.
  - 7.2. Resistance to impact: Up to 10 J.
8. Width: As indicated in bills of quantities
9. Features
  - 9.1. Flange type: Plain.
  - 9.2. Segregation: Not required.
  - 9.3. Protective cover: Not required.
10. Execution: [Installing cable tray and cable ladder](#)

### **Balanced twisted-pair cables Type A**

1. Standard: To [BS EN 50173-1](#).
2. Third-party certification: British Approvals Service for Cables ([BASEC](#))-certified.
3. Category: 6A.
4. Cable type: F/FTP.
5. Number of pairs: 4.
6. Size: 22 AWG (0.64 mm).
7. Sheath
  - 7.1. Type: LSHF.
  - 7.2. Colour: Blue.
8. Reaction to fire class
  - 8.1. Fire behaviour: B2<sub>ca</sub>.
  - 8.2. Additional classification for smoke production: s1b.
  - 8.3. Additional classification for flaming droplets and/ or particles: d1.
9. Execution: [Installing low-voltage cables Type A](#)

### **Video matrix switch controllers Type A**

1. Video inputs: Eight.
2. Video outputs: Eight.
3. Adjustable dwell time: 1-50 s.
4. Switching speed: < 20 ms.
5. Alarm inputs: Eight.

6. Alarm outputs: Eight.
7. Serial interface: RS-485.

## **Execution**

### **Installing video recorders**

1. Security: Protect from interference by unauthorized individuals.
2. Digital video recorder data and video connections: Complete.

### **Installing CCTV cameras**

1. Fixing equipment
  - 1.1. Generally: Fix independently of wiring installation with zinc electroplated fasteners.
  - 1.2. Orientation: Accurate and square to vertical and horizontal axes.
2. Final connection: Contain within PVC covered metal flexible conduit.

### **Installing CCTV cameras Type A**

1. Fixing equipment
  - 1.1. Generally: Fix independently of wiring installation with zinc electroplated fasteners.
  - 1.2. Orientation: Accurate and square to vertical and horizontal axes.
2. Final connection: Contain within PVC covered metal flexible conduit.

### **Installing CCTV monitors**

1. Security: Protect from interference by unauthorized individuals.
2. Monitor data and video connections: Complete.

### **Installing cable tray and cable ladder**

1. Standards: In accordance with [BS 7671](#) and [IET Guidance Note 1](#).
2. Preparation
  - 2.1. Burrs and sharp edges: Make smooth.
  - 2.2. Cutting: Minimize and make good edges. Cuts to cable tray to be square along an unperforated line.
  - 2.3. Treatment of cut surface: Extend 25 mm beyond the cut. Match finish of cable supports.
3. Access: Provide space around cable ladder and tray to permit access for installing and maintaining cables.
4. Joints and expansion couplers
  - 4.1. Position: Locate between the bracket support and the quarter point.
  - 4.2. Number of joints: Minimize.
  - 4.3. Lengths of cable ladder and tray: Maximize.
  - 4.4. Ends: Blank with end plates.
5. Changes of size and direction: Manufacturer's accessories of the same material type, pattern, finish and thickness as cable supports.
6. Fire barriers: Provide where required to maintain fire performance of fabric.
7. Protective covers: Provide to cables requiring mechanical protection.
8. Support
  - 8.1. Fixing arrangement:
  - 8.2. Clearance from building fabric (minimum): 20 mm.
9. Components: Avoid contact between dissimilar metals.

10. **Routing of cable ladder and tray:** Submit drawings showing the proposed routes of cable ladder and cable tray.

### **Installing low-voltage cables Type A**

1. **Standard:** In accordance with [BS 7671](#).
2. **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
3. **Preparation:** Store cables above 5°C for 24 hours before installation.

Clear cable path of debris.

4. **Installation temperature (minimum):** 5°C.
5. **Cables:** Install in one length. Dress cables flat, free from twists, kinks and strain.
6. **Cable pulling:** Do not overstress. Prevent kinks and twisting of the cable.
7. **Cable protection:** Cables passing through walls and floors to be sleeved with conduit or pipeduct to a minimum of 300 mm. Bush at both ends. Ensure that appropriate fire stopping materials are used to maintain the original fire integrity of the wall or floor around the penetration.
8. **Concealed cable runs to wall accessories:** Run vertically from the accessory.
9. **Exposed cable runs:** Minimum 25 mm between cable face and structure.
10. **Distance from other services running parallel (minimum):** 150 mm. Position cables below heating pipes.
11. **Jointing and termination**
  - 11.1. **Final circuit cables:** At electrical accessories only.
  - 11.2. **Core connections:** Using compression lugs to equipment without integral clamping terminals.
  - 11.3. **Terminating cables when not using glands:** Take sheathing of cables into accessory boxes and equipment and protect against abrasion with grommets.

### **Installing closed-circuit television systems**

1. **Standard:**
2. **Site survey:** Assess the site conditions and available artificial light.
3. **Access:** Locate system to provide safe access for maintenance and testing.

### **Installing signage**

1. **Position:** At main entrance.

## **System completion**

### **Closed-circuit television system testing and commissioning**

1. **Standard:** To [BS EN 62676-4](#).
2. **System commissioning agent:** Manufacturer representative
3. **Cable testing**
  - 3.1. **Insulation resistance:** Submit results.
  - 3.2. **Earth continuity:** Submit results.
4. **Camera coverage:** Adjust to obtain optimal performance with normal and infrared illumination.
5. **Infrared illuminators:** Accurately adjust to suit angle of associated cameras.
6. **Pan and tilt units:** Check accuracy of pre-set positions and demonstrate movement covers whole of relevant surveillance area.

7. **Alarm and motion detection devices:** Verify the operation, and adjust to provide maximum coverage.
8. **Image storage time:** Confirm.
9. **Live and recorded images:** Demonstrate from each camera and provide digital copies for reference purposes.

## **Documentation**

1. **Standard:** In accordance with [BS EN 62676-1-1](#).
2. **Operating and maintenance instructions**
  - 2.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 2.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 2.3. **Format:** Paper copy.
  - 2.4. **Number of copies:**
3. **Secure recording area logbook:** Hard back cover embossed 'CCTV LOGBOOK' with A4 lined paper, minimum 100 pages.
4. **Number of copies:** Two.
5. **Record drawings**
  - 5.1. **Content:** For all control cabling, the cable origin, circuit designation, route from control equipment to receivers, transmitters, recorders, cameras, and monitors. Include conductor material and c.s.a., insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder.
  - 5.2. **Format:** Electronic drawing.
  - 5.3. **Number of copies:** Two.
6. **Submittal date:** At handover.

## **Training**

1. **Operator training**
  - 1.1. **Training provider:** System supplier.

## **Fire detection and alarm systems**

### **Systems**

#### **Fire detection and alarm systems**

1. System performance: Performance of fire detection and alarm systems; Detection zones; Alarm zones; Actuation of fire protection systems; Integration with other alarm and security systems; External alarm signaling; Automatic transmission of alarm signals
2. System type: Addressable.
3. Detection devices
  - 3.1. Atmosphere: Normal.
  - 3.2. Types: Manual call points; Point heat detectors
4. Equipment interconnectivity: Fire-resistant screened (LSHF) cables
5. Cable containment:
6. Rewireable installation: Required.
7. Concealed installation: Required.
8. Internal alarms
  - 8.1. Primary: Fire alarm sounders
  - 8.2. Secondary: Visual alarm signal devices
9. Controls: Reference to missing clause Fire detection and alarm power supply equipment; Fire alarm input and output modules
10. System accessories:
11. Execution: Installing interfaces to other equipment and systems; Installing fire detection and alarm systems in non-domestic premises
12. System completion: System information; Device identification and testing; Testing and commissioning fire detection and alarm systems in non-domestic premises; Testing actuation, integration and interfacing with alarm and security systems; Documentation for fire detection and alarm systems in non-domestic premises

### **System performance**

#### **Performance of fire detection and alarm systems**

1. Spare system capacity: 10% of installed detection devices.

#### **Detection zones**

1. Zoning: Twenty

#### **Alarm zones**

1. Alarm zoning:
2. Mode of operation:
3. All zone evacuate control:

#### **Actuation of fire protection systems**

1. Standard: In accordance with [BS 7273-1](#).

#### **Integration with other alarm and security systems**

1. Objectives: All door to be disarmed
2. Systems to be integrated: HVAC controls

#### **External alarm signaling**

1. Objective: Direct fire responders

#### **Automatic transmission of alarm signals**

1. Means of signal transmission



- 1.1. **Secondary:** Via a dual path supervised premises transceiver with Ethernet primary and GRPS secondary.
2. **Transmission path monitoring:** Required.
3. **Signals to be transmitted to ARC:** Separately identifiable signals for pre-alarm, alarm, fault, device isolated and zone isolated.

## **Products**

### **Fire-resistant screened (LSHF) cables**

1. **Standard:** To [BS 7629-1](#).
2. **Third-party certification:** Loss Prevention Certification Board ([LPCB](#))-certified.
3. **Insulation:** EI 2.
4. **Fire resistance category:** STANDARD 60.
5. **Screen:** Aluminium tape.
6. **Execution:**

### **Fire alarm input and output modules**

1. **Standards:** To [BS EN 54-17](#).
2. **Device type:** Single input module.
3. **Mounting arrangement:** Suitable for mounting within fire detection and alarm control and indicating equipment (C.I.E.) .
4. **Enclosure**
  - 4.1. **Ingress protection (minimum):** To [BS EN 60529](#), IP 30.

### **Fire alarm sounders**

1. **Standard:** To [BS EN 54-17](#).
2. **Sounder type:** Electronic sounder.
3. **Sound patterns:** In accordance with [BS 5839-1](#).
4. **Integral beacon:** C-x-y.
5. **Execution:** [Installing sounders](#)

### **Manual call points**

1. **Standard:** To [BS EN 54-11](#).
2. **Designation:** Type A.
3. **Frangible element:** Non-resettable.
4. **Integral red visual indicator:** Required.
5. **Mounting:** Semi-recessed.
6. **Protective covers:** Required.

### **Point heat detectors**

1. **Standard:** To [BS EN 54-17](#).
2. **Classification:** A2.
3. **Suffix:** R.

### **Visual alarm signal devices**

1. **Standard:** To [BS EN 54-25](#).
2. **Device type:** Xenon beacon.
3. **Enclosure protection:** B.
4. **Category:** C-x-y.

## Execution

### Installing sounders

1. **Circuit wiring:** Wire sounders on a single radial circuit, and in addition, wire an independent radial circuit to a single sounder positioned above the main control panel.

### Installing fire detection and alarm systems in non-domestic premises

1. **Standard:** In accordance with [BS 5839-1](#).

### Installing interfaces to other equipment and systems

1. **Connection to equipment:** Install interconnecting wiring between interface unit and equipment controlled.
2. **Interface units:** Label, describing their function.

## System completion

### System information

1. **Device list:** Before commissioning, submit proposals, including proposed device, zone and group names.
2. **Zone diagram:** Before commissioning submit proposals.

### Device identification and testing

1. **Device identification:** Label devices with a unique address corresponding to that used by the CIE. Label non-addressable devices with a unique reference corresponding to that shown on the record drawings.
2. **Device testing:** Verify the operation of each device. Submit a schedule of devices, including the device test methods and results.

### Testing and commissioning fire detection and alarm systems in non-domestic premises

1. **Standard:** In accordance with [BS 5839-1](#).

### Testing actuation, integration and interfacing with alarm and security systems

1. **Connections with other systems and equipment:** Verify and demonstrate operation of the systems and equipment under fire and fault conditions.

### Documentation for fire detection and alarm systems in non-domestic premises

1. **Standard:** In accordance with [BS 5839-1](#).
2. **Operating and maintenance instructions**
  - 2.1. **Scope:** Submit for the system giving optimum settings for controls.
  - 2.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 2.3. **Format:** Paper copy.
  - 2.4. **Number of copies:** Two.
3. **Logbook:** Submit one copy in accordance with [BS 5839-1](#), Annex F.
4. **Record drawings**
  - 4.1. **Content:** General arrangement drawings showing the location of all control and indicating equipment, manual call points, detectors, radio transmitters and aerials, sounders, visual alarm signal devices, short circuit isolators, end of line devices, remote indicators, interface units connecting to other equipment, and automatic door hold open devices.
  - 4.2. **Drawing format:** Electronic drawing.
  - 4.3. **Number of copies:** Two.

- 4.4. **Submittal date:** At handover.
5. **Fire evacuation plan:** Submit electronic colour CAD layout.
6. **Certification**
  - 6.1. **Design certificate:** Submit two copies in accordance with [BS 5839-1](#), Annex G.1.
  - 6.2. **Installation certificate:** Submit two copies in accordance with [BS 5839-1](#), Annex G.2.
  - 6.3. **Commissioning certificate:** Submit two copies in accordance with [BS 5839-1](#), Annex G.3.

## **Building monitoring and management systems**

### **Systems**

#### **Building monitoring and management systems**

1. System performance: Design; Meter data; Liquid fuel supply systems monitoring and management; Fire fighting systems monitoring and management; Ventilation systems monitoring and management; Air conditioning systems monitoring and management; Low voltage supply monitoring and management; Communications systems monitoring and management; Television and data systems monitoring and management; Security systems monitoring and management; Detection and alarm systems monitoring and management
2. Liquid fuel supply systems linked to BMMS: Diesel.
3. Fire fighting systems linked to BMMS: Gaseous fire-extinguishing system.
4. Cooling systems linked to BMMS: Variable refrigerant flow system. Computer room Air-Conditioning System
5. Ventilation systems linked to BMMS: Fresh Air Supply units
6. Air conditioning systems linked to BMMS: Computer room air-conditioning equipment
7. Low voltage electricity supply systems linked to BMMS: Incoming electricity supply. Generator system. Low voltage distribution system. Low voltage small power system. Earthing and bonding system.
8. Communication systems linked to BMMS:
9. Television and data systems linked to BMMS: Television distribution system. Data distribution system.
10. Security systems linked to BMMS: Access control system. Intruder detection and alarm system. Closed circuit television system.
11. Detection and alarm systems linked to BMMS: Fire detection and alarm system. Water leak detection and alarm system.
12. Protection systems linked to BMMS: Lightning protection system.
13. Communications network type: Wired local area network. Wireless local area network.
14. Equipment: Field controllers
15. Equipment interconnectivity: Wired.
16. Cables: As Specialist's recommendations.
17. Containment: Cable baskets Type A
18. Rewireable installations: Required.
19. Concealed installations: Required.
20. Control equipment power supply: Mains supply.
21. Execution: Installation of building monitoring and management systems; Installation of field controllers; Installation of cables
22. System completion: Inspection and testing; Commissioning; Documentation

### **System performance**

#### **Design**

1. Design: Complete the design of the building monitoring and management system.
2. Standards
  - 2.1. Communications network: To [BS EN 50174-1](#).
  - 2.2. Communications protocol: To [BS EN ISO 16484-5](#).
  - 2.3. Documentation of plant and application specific functions: To [BS EN ISO 16484-3](#).

3. **Requirements:** Submit proposal including detailed design drawings, technical information, calculations and manufacturers' literature.

### **Meter data**

1. **Software functions:** Acceptance of data from other sources. Automatic production of routine reports. Automatic production of sub-billing. Comprehensive input of tariff definitions. Display of additional electrical data such as power factor, frequency, reactive power. Historical analysis of energy consumptions. Immediate warning of exceptions, such as parameters exceeding preset limits. Instant access on demand to data from individual meters. Retrieval, checking and collation of metered data. Review of data in flexible format, allowing comparison between different time periods and meter locations.

### **Liquid fuel supply systems monitoring and management**

1. **Input:** Alarms
2. **Output:** Message to Maintenance department

### **Fire fighting systems monitoring and management**

1. **Input:** Alarms
2. **Output:** Message to fire Authority

### **Ventilation systems monitoring and management**

1. **Input:** Fan failure alarm and filter blockage
2. **Output:** Message to maintenance department

### **Air conditioning systems monitoring and management**

1. **Input:** Alarms
2. **Control mode:**
3. **Output:** Message to Maintenance department

### **Low voltage supply monitoring and management**

1. **Input:** Alarms. Current. Fuses distribution. Monitoring contactors. Voltages.
2. **Control mode:** Critical start up scheduling. Load shedding.
3. **Output:** Message to maintenance department

### **Communications systems monitoring and management**

1. **Input:** lost connection
2. **Output:** Message to maintenance department

### **Television and data systems monitoring and management**

1. **Input:** lost connection
2. **Control mode:**
3. **Output:** message to maintenance department

### **Security systems monitoring and management**

1. **Input:** Forced door alarms. Individual occupancy sensor. Movement alarms. Occupancy sensor. Panic buttons.
2. **Output:** Activate CCTV. Control of lighting. Control of ventilation. Repeat alarms.

### **Detection and alarm systems monitoring and management**

1. **Input:** Alarm calls. Fire alarm.
2. **Output:** Shut down plant, including supply and extract fans, close inlet and outlet dampers.

## Products

### **Cable baskets Type A**

1. Standard: To [BS EN 61537](#).
2. Material: 5 mm steel wire.
3. Coating material: Powder coating.
4. Sizes
  - 4.1. Width: As indicated in the bills of quantities
  - 4.2. Side height: As indicated in the bills of quantities
5. Features
  - 5.1. Segregation: Not required.
  - 5.2. Protective cover: Not required.
6. Execution: [Installing cable basket Type A](#)

### **Field controllers**

1. Enclosure
  - 1.1. Ingress protection (minimum): To [BS EN 60529](#), IP54.
  - 1.2. Mounting:

Suitable for DIN rail mounting.
2. Network communications options: BACnet MS/TP.
3. Port arrangement: Fieldbus Port (RS485).
4. Controller inputs, sensors and devices: As indicated in the bills of quantities
5. Controller outputs, actuators and switching devices: As indicated in the bills of quantities
6. Internal power backup
  - 6.1. Type: Rechargeable batteries.
  - 6.2. Battery functions: Database storage and real-time clock battery back-up for 3 months minimum.
7. User interfaces: Access password protected programmable LCD with back light.
8. Execution: [Installing control components Type A](#)

## Execution

### **Installing cable basket Type A**

1. Standards: In accordance with [BS 7671](#) and [IET Guidance Note 1](#).
2. Joints: Cut adjacent cross basket wires. Make smooth any burrs or edges.
3. Accessories: Form on site and connect with basket manufacturer's coupling components.
4. Fire barriers: Provide where required to maintain fire performance of fabric.
5. Support
  - 5.1. Fixing arrangement: Independently fix and support from building structure using threaded rod fixed to channel cable support with shake proof washers and hex nuts.
  - 5.2. Clearance from building fabric (minimum): 20 mm.
6. Components: Avoid contact between dissimilar metals.
7. Routing of cable basket: Submit drawings showing the proposed routes.

## **Installing control components Type A**

1. **Standard:** In accordance with [BS 7671](#).
2. **Equipment and sensor identification labels:** Provide.
3. **Insulation:** Submit details of proposed insulation method where control components are on insulated pipelines.
4. **Supports:** Do not strain components.
5. **Access:** Adequate for operation and maintenance.

## **Installation of building monitoring and management systems**

1. **General:** Install in accordance with [BSRIA AG 9/2001](#).

## **Installation of field controllers**

1. **Clearance (minimum)**
  - 1.1. **Front access:** 500mm
  - 1.2. **Mounting height:** 1000 mm
2. **Fixing equipment:** Fix on DIN rail mounted within enclosure.

## **Installation of cables**

1. **Timing:** Do not start internal cabling until building enclosure provides permanently dry conditions.
2. **Cables:** Install in one uninterrupted run.
3. **Arrangement:** Position vertically and horizontally in line with equipment served, and parallel with building lines. Provide drip loop to prevent water entering equipment.
4. **Orientation:** Dress cables flat, free from twists, kinks and strain.
5. **Cable pulling**
  - 5.1. **Cable:** Do not overstress.
  - 5.2. **Installation method:** Submit proposals.
6. **Jointing:** At equipment and terminal fittings only.
7. **Cables routes generally:**
8. **Cables from other systems**
  - 8.1. **Segregation:** Segregate and cross at right angles.
  - 8.2. **Distance from steam and low temperature hot water systems running parallel:** 500 mm minimum.
9. **Cable terminations:** Support cable within 150 mm of termination.
10. **Balanced twisted-pair cabling**
  - 10.1. **Maximum untwist at terminations:** 12 mm.

## **System completion**

### **Inspection and testing**

1. **Standard:** In accordance with [BS 7671](#).
2. **Certificates**
  - 2.1. **Submission:** On completion
  - 2.2. **Number of copies:** 1.
3. **Test equipment identity:** Record on test certificates.
4. **Certificates of calibration:** Submit for each test instrument.
5. **Control panel test certificates**
  - 5.1. **Submission:** On completion

5.2. Number of copies: 1.

### **Commissioning**

1. **General:** Commission in accordance with [BSRIA AG 9/2001](#) and [BCIA Start up and commissioning guide](#).

### **Documentation**

1. **Operation and maintenance instructions**
  - 1.1. **Scope:** Submit giving optimum settings for controls.
  - 1.2. **Product information:** Include product description, date of purchase, performance characteristics, application (suitability for use), method of operation and control, and cleaning and maintenance requirements.
  - 1.3. **Format:** Paper copy.
  - 1.4. **Number of copies:** Two.
2. **Record drawings**
  - 2.1. **Content:** For all controls cabling, the cable origin, circuit designation, route, conductor material and insulation type and colour, number of cores per cable, number of cables in ducts, on tray or ladder. Location of control panels, equipment and repeater panels.
  - 2.2. **Format:** Electronic.
  - 2.3. **Number of copies:** Two.
3. **Submittal date:** At handover.



# Precision Air-conditioning Equipment Products

## Precision Air-conditioning Equipment

1. Standard: To [BS EN 13053](#).
2. Duty
  - 2.1. Air volume
    - 2.1.1. Supply: As indicated in bills of quantities
    - 2.1.2. Extract: As indicated in bills of quantities
  - 2.2. External resistance: As indicated in bills of quantities
  - 2.3. Discharge velocity: As indicated in bills of quantities
  - 2.4. Sound power level: As indicated in bills of quantities
3. Environment: Internal.
4. Casing construction
  - 4.1. Standard: To [BS EN 1886](#).
  - 4.2. Casing class: D2.
  - 4.3. Leakage class of casing: L2.
  - 4.4. Filter bypass leakage: To [BS EN 1886](#), section 7.
  - 4.5. Thermal performance of casing
    - 4.5.1. Thermal transmittance: T3.
    - 4.5.2. Thermal bridging: TB3.
  - 4.6. Acoustic insulation of casing: To [BS EN 1886](#), section 9.
  - 4.7. Fire protection: Category B.
  - 4.8. Mechanical safety: To [BS EN 1886](#), section 11.
  - 4.9. Material: Galvanized sheet steel.
  - 4.10. Finish: Painted.
5. Components
  - 5.1. Dampers
  - 5.2. Filters: As indicated in bills of quantities
  - 5.3. Humidifiers: As indicated in bills of quantities
  - 5.4. Cooling coils: [Refrigerant cooling coils](#)
  - 5.5. Heat recovery
  - 5.6. Supply fan
    - 5.6.1. Power input class: Class P1.
6. Accessories: Access panels. Anti-vibration mountings. Flexible connectors.
7. Execution: [Installing air-handling units](#); [Access](#); [Testing](#)

## Refrigerant cooling coils

1. Standard: To [BS EN 1216](#).
2. Duty
  - 2.1. Air volume: As indicated in bills of quantities
  - 2.2. Air velocity: As indicated in bills of quantities
  - 2.3. Air temperature

2.3.1. Air on dry bulb temperature: As indicated in bills of quantities

2.3.2. Air on wet bulb temperature: As indicated in bills of quantities

## **Execution**

### **Installing air-handling units**

1. **Standard:** In accordance with [BS EN 13053](#).
2. **Component assembly**
  - 2.1. **Sealing:** Provide gaskets between air-handling unit sections to prevent air leakage from casing.
  - 2.2. **Site-drilling :** Site-drilling of air-handling unit not permitted.

### **Access**

1. **Access space:** Position air-handling units to allow space for maintenance and access.

### **Testing**

1. **Test location:** Factory. On site before incorporation in works.
2. **Tests:** Component air pressure drops. Component water pressure drops. Fan and motor speeds. Fan running to check rotation and vibration. Fan flow rate and developed pressure, using simulated system resistance. Functional test on electrical equipment. Motor starting and running currents. Power consumption. Sound power level. Vibration measurements.
3. **Test results:** Submit on completion.

# Generator control panels

## Products

### Generator control panels

1. **Standard:** To [BS ISO 8528-4](#) and ENA [G59/2-1](#) .
2. **Configuration:** Group controls, alarms and indicators in common control panel. Group controls, alarms and indicators in common control panel.
3. **Enclosure**
  - 3.1. **Ingress protection (minimum):** To [BS EN 60529](#), IP21.
  - 3.2. **Material:** Stainless steel.
  - 3.3. **Finish:** Epoxy powder coated.
4. **Battery charger**
  - 4.1. **Type:** Electronic solid-state controller, constant voltage, current-limited.
  - 4.2. **Output voltage:** 24 V d.c.
  - 4.3. **Battery recharge time:** To 80% capacity within 12 hours and 100% capacity within 24 hours.
  - 4.4. **Mode of operation:** Batteries charged from mains when available, and charge alternator on engine when running.
5. **Controls:** Alarm reset. Automatic/ Manual switch. Emergency stop. Frequency adjust. Key operated start/ stop switch. Lamp test. Load bank test. Mains failure simulation. Maintenance bypass. Mute alarm. Return to mains operation. Voltage adjust  $\pm 5\%$ .
6. **Indicators**
  - 6.1. **Electrical:** Ammeter with phase selector switch. Battery voltage. Frequency meter. Generator synchronized. kW·h meter. Power factor meter with phase selector switch. Voltmeter with phase selector switch.
  - 6.2. **Prime mover:** Coolant temperature gauge. Fuel gauge. Oil pressure gauge. Tachometer.
  - 6.3. **Status:** Coolant heater on. Emergency stop activated. Generator in use. Generator ready. Mains available indicator. Mains failure indicator. Oil heater on. Hours run meter.
7. **Alarms**
  - 7.1. **Visual:** Battery charge failure. Battery high voltage. Battery low voltage. Cooling fan failure. Engine overspeed. Engine start failure. Engine underspeed. High oil temperature. Low fuel.
  - 7.2. **Audible:** Common alarm with mute button.

## Generator sets

### Products

#### Generator sets

1. Description: 350 KVA Continuous rated Generator Set
2. Standard: To [BS ISO 8528-5](#).
3. Internal combustion engine
  - 3.1. Standards
    - 3.1.1. Generally: To [BS ISO 8528-2](#).
    - 3.1.2. Overspeed protection: To [BS 5514-6](#).
  - 3.2. Engine type: Compression-ignition.
  - 3.3. Air and fuel intake
    - 3.3.1. Type: Turbocharged.
    - 3.3.2. Air filters: Manufacturer Standard
    - 3.3.3. Fuel filters: Manufacturer Standard
  - 3.4. Lubrication
    - 3.4.1. Oil filters: Manufacturer Standard
    - 3.4.2. Drain valve: Oil drain line extended to the edge of the base frame
    - 3.4.3. Oil reservoir tank: Provide with a 2 L capacity; include oil level monitoring and a drain valve located to facilitate gravity oil removal.
  - 3.5. Cooling system
    - 3.5.1. Cooling medium: Closed-circuit pressurized water-based.
    - 3.5.2. Radiator: Engine mounted.
    - 3.5.3. Fan: Engine driven and mounted.
    - 3.5.4. Drain valve: Locate to provide easy maintenance
  - 3.6. Engine starting method: Electric starter motor.
4. Alternator
  - 4.1. Standards: To [BS 5000-3](#), and [BS ISO 8528-3](#) or [BS EN 60034-22](#).
  - 4.2. Rated power output: 350 kW A. Continuous
  - 4.3. Format: Synchronous.
  - 4.4. Excitation: Self.
  - 4.5. Short-circuit withstand capability (minimum): 2.5 times full load, short-circuit current for 5 s.
  - 4.6. Protection: MCCB with over current and earth fault inverse definite minimum time lag relay
  - 4.7. Overspeed withstand: 120% rated speed
  - 4.8. Thermal classification: To BS EN 60085, Class H
  - 4.9. Ingress protection (minimum): To [BS EN 60034-5](#), IP 32.
  - 4.10. Output cable terminal boxes
    - 4.10.1. Configuration: Removable lid and side covers
    - 4.10.2. Outgoing cable entry: Top.
5. Control systems
  - 5.1. Standards

- 5.1.1. Generally: To [BS ISO 8528-4](#) and [EREC G59/3](#).
- 5.1.2. Speed governing: To [BS ISO 8528-5](#) and [BS ISO 3046-4](#).
- 5.1.3. Voltage regulation: To [BS ISO 8528-5](#) and [BS 4999-140](#).
- 5.2. Enclosure
  - 5.2.1. Mounting position: Integral to the generating set.
  - 5.2.2. Ingress protection (minimum): To [BS EN 60529](#), IP21.
  - 5.2.3. Material: Manufacturer Standard
  - 5.2.4. Finish: Manufacturer Standard
  - 5.2.5. Colour: Manufacturer Standard
- 5.3. User interface: LCD alphanumeric display with integrated operation keys and LED indication.
- 5.4. Control functions: Automatic/ manual selection. Emergency stop. Fault reset. Manual start/ stop. Voltage and frequency adjust  $\pm 5\%$ .
- 5.5. Measurement and indication
  - 5.5.1. Engine: Engine coolant temperature. Engine speed. Hours run. Lubricating oil pressure. Lubricating oil temperature. Starting system battery voltage.
  - 5.5.2. Alternator: Alternating current for each phase. Frequency. Power factor total and each phase indicating lead or lag condition. Total load (active power kW). Total load (apparent power kV A). Voltage (L-L & 3x L-N). Voltage (L-N).
  - 5.5.3. Status: Coolant heater on. Emergency stop activated. Generator in use. Generator ready. Generator off-load. Generator on-load. Mains available. Mains failure. Not in automatic. Oil heater on.
- 5.6. Protection
  - 5.6.1. Engine: Battery charger malfunction alarm. Battery low voltage alarm. Emergency stop, immediate shutdown and prevention of operation. Engine coolant over temperature alarm and load disconnection. Engine coolant low temperature alarm. Failure to crank shutdown. Fail to start alarm. Low fuel level alarm. Low oil pressure shutdown. Overspeed shutdown.
  - 5.6.2. Alternator: Earth fault shutdown. Over and under frequency shutdown. Over and under voltage shutdown. Over current and short circuit shutdown. Over current warning.
- 5.7. Alarms: Audible and visual with common audible reset.
- 5.8. Communications interface: Auxiliary output relays. Modbus. USB port.
- 6. Sub-base fuel tank
  - 6.1. Capacity (minimum): Manufacturer Standard
  - 6.2. Tank type: Steel double skinned, mounted integral to the generator base frame.

## **Network video recorders**

### **Products**

#### **Network video recorders**

1. Description:
2. Manufacturer:
3. Video system:
4. Video compression formats:
5. Bandwidth (minimum):
6. Recording speed and resolution:
7. Recording mode:
8. Digital watermarking:
9. Playback function:
10. Video search function:
11. Video inputs:
12. Video outputs:
13. Audio inputs:
14. Audio outputs:
15. Alarms:
16. Screen display
  - 16.1. Window arrangement:
  - 16.2. Display the following information:
17. Display resolution (minimum):
18. Storage media
  - 18.1. Type: Dual hard disk.
  - 18.2. Capacity:
19. Network connectivity: 10/100 base T via RJ45.
20. Network protocols:
21. Video backup:
22. Telemetry protocol:
23. Power supply: 230 V a.c.
24. Mounting:
25. Execution:

## **Surveillance monitors**

### **Products**

#### **Surveillance monitors**

1. Description:
2. Manufacturer:
3. Third party certification: [BEAB](#).
4. Monitor type: Liquid crystal display (LCD).
5. Size (nominal diagonal):
6. Video system:
7. Resolution (minimum):
8. Response time (maximum): 5 ms.
9. Video inputs:
10. Audio inputs:
11. Mounting:
12. Accessories:
13. Execution:

## **Balanced twisted-pair cables**

### **Products**

#### **Balanced twisted-pair cables**

1. Description:
2. Manufacturer:
3. Standard:
4. Third-party certification:
5. Category:
6. Cable type:
7. Number of pairs:
8. Size:
9. Sheath
  - 9.1. Type:
  - 9.2. Colour:
10. Reaction to fire class
  - 10.1. Fire behaviour:
  - 10.2. Additional classification for smoke production:
  - 10.3. Additional classification for flaming droplets and/ or particles:
  - 10.4. Additional classification for acidity:
11. Execution:



## **Fuel-sensing cables**

### **Products**

#### **Fuel-sensing cables**

1. Standards: Equipment for non-explosive atmospheres to [BS EN 61010-1](#).
2. Equipment category:
3. Liquid to be detected: Hydrocarbon.
4. Response time (maximum): 60 s at 20°C.
5. Water resistance: Required.
6. Resettability: Not required. Required.
7. Exposure limits: -20 to +60°C.
8. Cable length: To suit the application.
9. Leak location accuracy: +/- 1 m.
10. Accessories: Connector kits. End terminations. Hold-down clips. Identification tags.
11. Execution: [Installing cable and tape sensors](#)

### **Execution**

#### **Installing cable and tape sensors**

1. Standard: In accordance with [BS 7671](#).
2. Fasteners
  - 2.1. Floors and ceilings: Self-adhesive clips.
  - 2.2. Pipework: Reusable wrap around bands.
3. Coverage: Lay in loops or wave pattern.
4. Spacing between cables and between tapes (maximum): 0.5 m.
5. Connections to control panel: Required.

## **Video matrix switch controllers**

### **Products**

#### **Video matrix switch controllers**

1. Description:
2. Manufacturer:
3. Video inputs:
4. Video outputs:
5. Adjustable dwell time:
6. Switching speed: < 20 ms.
7. Alarm inputs:
8. Alarm outputs:
9. Serial interface:

## **Generator enclosures**

### **Products**

#### **Generator enclosures**

1. **Description:** Enclosure for 500KVA Generator set
2. **Format:** Acoustic. Weather protective.
3. **Material:** 2mm steel
4. **Finish:** Epoxy powder coated.
5. **Colour:** Manufacturer Standard
6. **Size (l x w x d):** Manufacturer Standard
7. **Personnel access doors:** Required.
8. **Removable side panels:** Required.
9. **Louvres**
  - 9.1. **Type:** Manufacturer standard
  - 9.2. **Dampers:** Automatic.
10. **Acoustic performance (maximum under full load):** 85 dBA at 1 m from generator enclosure.

## **Low-voltage switchgear enclosures**

### **Products**

#### **Low-voltage switchgear enclosures**

1. Description:
2. Manufacturer:
3. Standard: To [BS EN 62208](#).
4. Ingress protection (minimum):
5. Impact protection (minimum):
6. Dimensions
  - 6.1. Length:
  - 6.2. Width:
  - 6.3. Height:
7. Material:
8. Finish:
9. Access:
10. Handles:
11. Internal mounting plate:
12. Cable gland plate:
13. Mounting:
14. Arrangement:
15. Rated insulating voltage:
16. EMC shielding performance (minimum):
17. Service conditions:
18. Hardware:
19. Labelling: Describe controlgear purpose.

## **SECTION 9: STANDARD FORMS**

- I. Form of Invitation for Tenders
- II. Letter of Acceptance
- III. Form of Agreement
- IV. Form of Contract
- V. Form of Tender Security
- VI. Performance Bank Guarantee
- VII. Qualification Information
- VIII. Tender Questionnaire
- IX. Confidential Business Questionnaire
- X. Letter of Notification of Award
- XI. Request for Review Form
- XII. Anti-Corruption Declaration Commitment/Pledge
- XIII. Non- Debarment Statement Form
- XIV. Site Visit Form
- XV. Manufacturer's Authorization

## FORM OF INVITATION FOR TENDERS

(Date)  
(Name of Contractor)  
(address)

Dear Sirs:

**Reference: PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**

You have been prequalified to tender for the above project.

We hereby invite you and other prequalified tenderers to submit a tender for the execution and completion of the above Contract.

A complete set of tender documents may be download by you from **www.kra.go.ke**

Completed Bids are to be saved as PDF documents marked "**KRA/HQS/NCB-045/2020-2021: : Proposed Refurbishment of Times Tower Data Center, Nairobi**" submitted to the appropriate KRA E-procurement Web Portal found on the KRA website so as to be received on or be **16<sup>TH</sup> March 2021 at 11.00 a.m.**

Please confirm receipt of this letter immediately in writing by

cable/facsimile or telex. Yours faithfully,

- Authorized Signature

- Name and Title

## LETTER OF ACCEPTANCE

(Date)

To:

(Name of Contractor)

(Address)

Dear Sir,

This is to notify you that your Tender dated for the execution of **Proposed Refurbishment of Times Tower Data Center, Nairobi** for the execution of *(name of the Contract and identification number, as given in the Tender Documents)* for the Contract Price of Kshs. *(amount in figures)* Kenya Shillings

*(amount in Words) in  
accordance*

with the Instructions to Tenderers is hereby accepted.

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents:

Authorized Signature:

Name and Title of Signatory:

Attachment: Agreement



## FORM OF AGREEMENT

THIS AGREEMENT, made the \_\_\_\_\_ day of \_\_\_\_\_ 20 between \_\_\_\_\_ of **Kenya Revenue Authority** of (or whose office is situated at) **Times Tower Building, Nairobi** (herein after called "the Employer") of the one part AND \_\_\_\_\_ of (or whose registered office is situated at) \_\_\_\_\_ (herein called "the Contractor") of the other part.

WHEREAS THE Employer is desirous that the Contractor executes **Proposed Refurbishment of Times Tower Data Center Nairobi** and the Employer has accepted the tender submitted by the Contractor for the execution and completion of such works and the remedying of any defects therein for the Contract Price of Ksh \_\_\_\_\_ (Amount in figures) Kenya Shillings

\_\_\_\_\_ (Amount in Words)

NOW THIS AGREEMENT WITNESSETH as follows:

- 1). In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to
- 2). The following documents shall be deemed to form and shall be read and construed as part of this Agreement I,e,
  - (i) Letter of acceptance
  - (ii) Form of Tender
  - (iii) Conditions of Contract Part I
  - (iv) Conditions of Contract Part II and Appendix to Conditions of Contract
  - (v) Specifications
  - (vi) Drawings

(vii) Priced Bills of Quantities

3). In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the contract.

4). The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The common Seal of: \_\_\_\_\_

Was hereunto affixed in the presence of: \_\_\_\_\_

Signed Sealed, and Delivered by the Said: \_\_\_\_\_

Binding Signature of Employer: \_\_\_\_\_

Binding Signature of Contractor: \_\_\_\_\_

In the Presence of (i) Name: \_\_\_\_\_

Address: \_\_\_\_\_

Signature: \_\_\_\_\_

(ii) Name: \_\_\_\_\_

Address: \_\_\_\_\_

Signature: \_\_\_\_\_

## FORM OF CONTRACT

THIS AGREEMENT made the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_

Between Kenya Revenue Authority of Kenya of the one part and  
.....[name of tenderer]of .....[city and  
country of tenderer] (hereinafter called "the tenderer) of the other part;

WHEREAS the Procuring entity invited tenders for certain works/ goods ] and has  
accepted a tender by the tenderer for the **Proposed Refurbishment of Times  
Tower data center** in the sum of .....[contract price in words  
and figures] (hereinafter called "the contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS

1. In this Agreement words and expressions shall have the same meaning as  
are respectively assigned to them in the Conditions of Contract referred to  
:
2. The following documents shall be deemed to form and be read and  
construed as part of this Agreement viz:
  - a) The Tender Form and Price Schedule submitted by the tenderer
  - b) The Schedule of Requirements.
  - c) The Technical Specifications.
  - d) The General conditions of Contract.
  - e) The Special Conditions of Contract; and
  - f) The Procuring entity's Notification of Award.
3. In consideration of the Payments to be made by the procuring entity to  
the tenderer as hereinafter mentioned, the tender hereby covenants with  
the Procuring entity to provide the works/goods and to remedy defects  
therein in conformity in all respects with the provisions of the Contract.
4. The Procuring entity hereby covenants to pay the tenderer in  
consideration of the Supply, Delivery, Installation and Associated Works for  
water purification dispensers and remedying of defects therein, the  
contract Price or such other sum as may become payable under the  
provisions of the Contract at the times and in the manner prescribed by  
the contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, Sealed, delivered by \_\_\_\_\_ the \_\_\_\_\_ (for the procuring entity

Signed, Sealed, delivered by \_\_\_\_\_ the \_\_\_\_\_ (for the procuring entity

## FORM OF TENDER SECURITY

WHEREAS \_\_\_\_\_ (hereinafter called "the Tenderer") has submitted his tender dated \_\_\_\_\_ for the construction of

(Name of Contract)

KNOW ALL PEOPLE by these presents that WE having \_\_\_\_\_ our registered office at \_\_\_\_\_ (hereinafter called "the Bank"), are bound unto **Kenya Revenue Authority** (hereinafter called "the Employer") in the sum of kshs \_\_\_\_\_ for which payment and truly to be made to the said Employer, the Bank binds itself its successors and assigns by these presents sealed with the common Seal of the said Bank this \_\_\_\_\_ Day of \_\_\_\_\_ 20\_\_

THE CONDITIONS of this obligations are: -

1. If after tender opening the tenderer withdraws his tender during the period of tender validity specified in the instructions to tenderers

Or

2. If the tenderer, having been notified of the acceptance of his tender by the Employer during the period of tender validity:

a). Fails or refuses to execute the form of Agreement in accordance with the instructions to Tenderers, If required or

b) Fails or refuses to furnish the performance security, in accordance with the Instructions to tenderers;

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the Employer having to substantiate his demand, provide that in his demand the Employer will note that the amount claimed by him is due to him, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including thirty (30) days after the period of tender validity, and any demand in respect thereof should reach the Bank not later than the said date.

.....  
(Date)

.....  
(witness)

.....  
(Signature of the Bank)

.....  
(seal)

**PERFORMANCE BANK GUARANTEE**

To: Kenya Revenue Authority.  
P.O. Box 48240 + 00100.  
Nairobi, Kenya.

Dear Sir,

WHEREAS.....(hereinafter.....called....."the...  
...Contractor").....has undertaken, in pursuance of Contract No. **Proposed  
Refurbishment of Times Tower Data Center, Nairobi.** (hereinafter called. "the  
works);

AND WHEREAS it has been stipulated by you in the said contract that the  
Contractor shall furnish you with a Bank Guarantee by a recognized bank for  
the sum specified therein as security for Should comply with his obligations in  
accordance with the contract;

AND WHEREAS we have agreed to give the Contractor such a Bank  
Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible  
to you, on behalf of the Contractor, up to a total of  
Kshs.....(amount of Guarantee in figures) kenya  
Shillings.....  
.....  
.....(amount in Guarantee in Words) and we undertake to pay you; upon  
your first written demand and without cavil or argument' any sum or sums within  
the limits of Kenya  
Shillings..... (amount of  
Guarantee in words) as aforesaid without your needing to prove or to show  
grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the  
Contractor before presenting us with the demand.

We further agree that no change, addition or other modification of the terms of  
the Contract or of the works to be performed thereunder or of any of the  
contract documents which may be made between you and the Contractor  
shall in any way release us from any liability under this Guarantee, and we  
hereby waive notice of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of  
Completion.

SIGNATURE AND SEAL OF THE GUARANTOR: - \_\_\_\_\_

Name of Bank: - \_\_\_\_\_

Address: - \_\_\_\_\_

Date: - \_\_\_\_\_

## QUALIFICATION INFORMATION

### Individual Tenderers or Individual Members of Joint Ventures

1.1. Constitution or legal status tenderer {attach copy or Incorporation Certificate}; Place of Registration: \_\_\_\_\_

Principal place of Business: \_\_\_\_\_

Power of attorney of signatory of tender:

1.2. Total annual volume of construction work performed in the last five years

Year	Volume	
	Currency	Value

1.3. Work performed as Main Contractor on works of similar nature and volume over the last five years. Also list details of work under way or committed, including expected completion date.

Project Name	Name of Client and Contact Person	Type of work performed and year of	Value of Contract

1.4. Major Items of Contractor's Equipment proposed for carrying out the works. List all information requested below.

Item of Equipment	Description Make and Age(years)	Condition (new, good, Poor) and number available	Owned ,leased(from whom?)or to be purchased (from whom?)




1.5. Qualifications and experience of key personnel for administration and execution of the Contract. Attach biographical data.

<b>Position</b>	<b>Name</b>	<b>Years of experience (General)</b>	<b>Years of experience in proposed position</b>

1.6. Financial reports for the last five years: balance sheets, profit and loss statements, auditor's reports, etc. List below and attach copies.

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1.7. Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List below and attach copies of supportive documents.

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1.8. Name, address and telephone, telex and facsimile numbers of banks that may provide reference if contacted by the Employer.

---

1.9. Statement of Should comply with the requirements of Clause 1.2 of the Instructions to Tenderers.

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1.10. Proposed program (work method and schedule) for the whole of the Works.

## 2. Joint Ventures

- 2.1 The information listed in 1.1 – 1.10 above shall be provided for each partner of the joint venture.
- 2.2 The information required in 1.11 above shall be provided for the joint venture.
- 2.3 Attach the power of attorney of the signatory(ies) of the tender authorizing signature of the tender on behalf of the joint venture
- 2.4 Attach the Agreement among all partners of the joint venture (and which is legally binding on all partners), which shows that:
  - a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms;
  - b) one of the partners will be nominated as being in charge, authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture; and
  - c) the execution of the entire Contract, including payment, shall be done exclusively with the partner in charge

## **TENDER QUESTIONNAIRE**

1. Full names of tenderer

.....

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

.....

3. Telephone number(s) of tenderer

.....

4. Telex address of tenderer

.....

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

.....

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

.....

.....  
Signature of Tender

### CONFIDENTIAL BUSINESS QUESTIONNAIRE FORM

You are requested to give the particulars indicated in Part 1; either Part 2(a), 2(b) or 2 (c) whichever applied to your type of business; and Part 3.

You are advised that it is a serious offence to give false information on this form.

Part 1 - General				
1.1.	Business Name.....			
1.2.	Location of Business Premises. .....			
1.3.	Plot No.....Street/Road..... ..... Postal Address..... Tel No.....Fax..... Email.....			
1.4.	Nature of Business.....			
1.5.	Registration Certificate No. .....			
1.6.	Maximum Value of Businesses which you can handle at any one time – Ksh.....			
1.7.	Name of your Bankers..... Branch... .....			
Part 2 (a) – Sole Proprietor				
2a.1.	Your Name in Full.....			Age.....
2a.2.	Nationality .....			Country of Origin .....
Citizenship Details .....				
Part 2(b) Partnership				
2b.1. Given the details of Partners as follows:				
2b.2.	<b><u>Name</u></b>	<b><u>Nationality</u></b>	<b><u>Citizenship Details</u></b>	<b><u>Shares</u></b>
1.	.....			
2.	.....			
3.	.....			
4.	.....			
5.	.....			
Part 2 (c) – Registered Company				

2c.1. Private or Public

.....  
.....

2c.2 State the Nominal and Issued Capital of Company –

Nominal Kshs. ....

Issued Kshs. ....

2c.3. Given details of all Directors as follows

2b.2. **Name**                      **Nationality**                      **Citizenship Details**                      **Shares**

1.....

2.....

3.....

4.....

5.....

Part 3 – Eligibility Status

3.1. Are you related to an Employee, Committee Member or Board Member of Kenya Revenue Authority? Yes\_\_\_\_\_No\_\_\_\_\_

3.2 If answer in '3.1' is YES give the relationship.

.....  
.....  
.....

3.3. Does an Employee, Committee Member, Board Member of Kenya Revenue Authority sit in the Board of Directors or Management of your Organization, Subsidiaries or Joint Ventures? Yes\_\_\_\_\_No\_\_\_\_\_

3.4. If answer in '3.3' above is YES give details.

.....  
.....  
.....

3.5 Has your Organization, Subsidiary Joint Venture or Sub Contractor been involved in the past directly or indirectly with a firm or any of its affiliates that have been engaged by Kenya Revenue Authority to provide consulting services for preparation design, specifications and other document to be used for procurement of the goods under this invitation?

Yes\_\_\_\_\_No\_\_\_\_\_

3.6 If answer in '3.5' above is YES give details.

.....  
.....  
.....  
.....

3.7. Are you under declaration of ineligibility for corrupt and fraudulent practices? Yes\_\_\_\_\_No\_\_\_\_\_

3.8. If answer in '3.7' above is YES give details:

.....  
.....  
.....

.....  
.....  
.....

3.9. Have you offered or given anything of value to influence the procurement process? Yes \_\_\_\_\_ No \_\_\_\_\_

3.10. If answer in '3.9' above is YES give details

.....  
.....  
.....  
.....  
.....

I DECLARE that the information given on this form is correct to the best of my knowledge and belief.

Date.....Signature of Candidate.....

- If a Kenyan Citizen, indicate under "Citizenship Details" whether by Birth, Naturalization or registration

**LETTER OF NOTIFICATION OF AWARD**

RE: Tender No.: **KRA/HQS/NCB-045/2020-2021**

Tender Name: **Proposed Refurbishment of Times Tower Data Center**

This is to notify that the contract/s stated below under the above-mentioned tender have been awarded to you.

.....

.....

1. Please acknowledge receipt of this letter of notification signifying your acceptance.
2. The contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.
3. You may contact the officer(s) whose particulars appear below on the subject matter of this letter of notification of award.

*(FULL PARTICULARS*

.....

.....

.....  
SIGNED FOR  
ACCOUNTING  
OFFICER

**REPUBLIC OF KENYA**  
**PUBLIC PROCUREMENT ADMINISTRATIVE REVIEW BOARD**

APPLICATION NO \_\_\_\_\_ OF \_\_\_\_\_ 20

BETWEEN APPLICANT

AND

**Kenya Revenue Authority**

Request for review of the decision of the **Kenya Revenue Authority of**

\_\_\_\_\_ dated the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_ in the matter of Tender  
No. KRA/HQS/NCB-008/2020-2021 of \_\_\_\_\_

**REQUEST FOR REVIEW**

I/We \_\_\_\_\_ the above named Applicant(s), of address: Physical address\_  
Fax No. \_\_\_\_\_ Tel No. \_\_\_\_\_ Email \_\_\_\_\_ hereby request  
the Public Procurement Administrative review board to review the whole/part of the  
above-mentioned decision on the following grounds, namely:

1. \_\_\_\_\_
2. \_\_\_\_\_ etc.

By this memorandum, the Applicant requests the Board for an order/orders that: -

1. \_\_\_\_\_
2. \_\_\_\_\_

SIGNED \_\_\_\_\_ (Applicant)  
Dated on \_\_\_\_\_ day of \_\_\_\_\_ /20

**FOR OFFICIAL USE ONLY**

Lodged with the Secretary Public Procurement Administrative Review Board on day of  
20\_\_\_\_\_

.....SIGNED  
Board Secretary



**ANTI-CORRUPTION DECLARATION COMMENT/PLEDGE**

**(Section 62, 65 and 66 of the PPAD Act, 2015)**

I/We/Messrs. .... of Street,  
Building, P.O. Box.....  
Contact/Phone/Email .....

Declare the Public Procurement is based on a free and fair competitive tendering process which should not be open to abuse

I/We .....  
declare that

I/We will not offer or facilitate, directly or indirectly, any inducement or reward to any public officer, the relations or business associates, in connection with Tender/Tender No. **Proposed Refurbishment of Times Tower Data Center (KRA/HQS/NCB-045/2020-2021 for** or in the subsequent performance of the contract if I/we am/are successful.

Authorized Signature:

..... Name and Title

of Signatory: .....

**NON-DEBARMENT STATEMENT FORM**

I/We/Messrs.....of  
Street/Avenue,

..... Building, P.O. Box ..... Code ....., of .....  
(Town), .....

(Nationality), Phone ..... E-mail ..... declare that I/we/Messrs.  
..... are not debarred from participating in public procurement by the  
Public Procurement Oversight Authority pursuant to section 115 of the Public  
Procurement and Disposal Act, 2005.

Dated this ..... day of  
20.....

Authorized

Signature:

..... Official Stamp:

..... Name and Title of

Signatory: .....

**CONFIRMATION OF PRE-BID SITE VISIT**

Name of Tenderer: \_\_\_\_\_

Date of Visit: \_\_\_\_\_

Name, position and signature of Tenderer's staff visiting the site. Name: \_\_\_\_\_

Position: \_\_\_\_\_

Signature: \_\_\_\_\_ Tenderer's Official Stamp: \_\_\_\_\_

Site Visit conducted by **Kenya Revenue Authority** Officer's: Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Signature: \_\_\_\_\_

## MANUFACTURER'S AUTHORIZATION

To: Deputy Commissioner – Supply Chain Management  
Kenya Revenue Authority  
P.O. Box 48240 - 00100  
Nairobi

**RE: TENDER NO. KRA/HQS/NCB-045/2020-2021:  
PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**

WHEREAS \_\_\_\_\_ who are official producers of  
\_\_\_\_\_ and having production facilities at  
\_\_\_\_\_ do hereby authorize  
\_\_\_\_\_ located at  
\_\_\_\_\_ (hereinafter, the "Bidder") to  
submit a bid and subsequently negotiate and sign a Contract with you for resale of the  
following Products produced by us:

We hereby confirm that, in case the bidding results in a Contract between you and the Bidder, the above-listed products will come with our full standard warranty.

Name In the capacity of

Signed

Duly authorized to sign the authorization for and on behalf of: \_\_\_\_\_

Dated on \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

**Note:** This authorization should be written on the letterhead of the Manufacturer and be signed by a person with the proper authority to sign documents that are binding on the Manufacturer.

## **SECTION 10: FINANCIAL PROPOSAL**

## FINANCIAL INSTRUCTIONS

3. Form of Tender (duly filled, signed and stamped)
4. Priced bills of quantities

**This tender is based on TWO (2) bid envelope system**

***The bidder shall submit technical electronically Proposals via the supplier portal to Tech Bid C-Folder and Financial Proposals submitted electronically via the supplier portal to notes and attachment folder via the supplier folder in the respective folder within the tendering period***

## **FORM OF TENDER**

**FORM OF TENDER**

Date \_\_\_\_\_

Tender No. \_\_\_\_\_

To: KENYA REVENUE AUTHORITY  
P. O. BOX 48240 – 00100 NAIROBI.

Gentlemen and/or Ladies:

1. Having examined the tender documents including Addenda Nos. .... [insert numbers].the receipt of which is hereby duly acknowledged, we, the undersigned, offer to (**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTRE**) in conformity with the said tender documents for the sum of ..... **(total tender amount in words and figures)** or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Tender.

2. We undertake, if our Tender is accepted, to deliver install and commission the equipment in accordance with the delivery schedule specified in the Schedule of Requirements.

3. If our Tender is accepted, we will obtain the guarantee of a bank in a sum of equivalent to \_\_\_\_\_ percent of the Contract Price for the due performance of the Contract , in the form prescribed by ...**KRA.**( *Procuring entity*).

4. We agree to abide by this Tender for a period of **335 days** from the date fixed for tender opening of the Instructions to tenderers, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. This Tender, together with your written acceptance thereof and your notification of award, shall constitute a Contract, between us. Subject to signing of the Contract by the parties.

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

[signature]

[in the capacity of]



## **BILL OF QUANTITIES**

KENYA REVENUE AUTHORITY  
 PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER  
 TENDER REF NO: KRA/HQS/NCB/045/2020-2021  
 BILLS OF QUANTITIES

Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:1</u></b>				
	<b><u>BILL NO:1</u></b>				
	<p><b>A. Supply and Install fire stopping systems based on a solid sealant only, or combinations of solid sealant, foam sealant, and refractory fibers of thickness required to attain 2 Hours hour ratings.</b></p> <p><b>B. Systems shall:</b></p> <p style="padding-left: 40px;"><b>1. Provide a flexible seal to prevent passage of fire, smoke, toxic gases and water through openings, and prevent transmission of sound and vibration from the penetrating element to the structure.</b></p>				
	<b><u>Circular Penetrations</u></b>				
1	100mm Diameter and 200mm Depth	No	10		
2	Ditto 150 mm Diameter	No	20		
3	Ditto 200 mm Diameter	No	2		
4	Ditto 300 Diameter	No	5		
	<b><u>Rectangular Penetrations</u></b>				
5	400mm (L) X 200 mm ( W) X 200 mm ( D)	No	30		
6	400mm (L) X 300 mm ( W) X 200 mm ( D)	No	10		
7	350mm (L) X 300 mm ( W) X 200 mm ( D)	No	10		
8	900mm (L) X 150 mm ( W) X 200 mm ( D)	No	5		
9	100mm (L) X 200 mm ( W) X 200 mm ( D)	No	20		
	<b>Carried Forward</b>			KES	
	Section No. 1 Bill No. 1 PENETRATION FIRESTOPPING				



KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:2</u></b>				
	<b><u>DOORS</u></b>				
	<b><u>FIRE DOOR SETS</u></b>				
	The following in fire resistant door sets comprising door leaf with mineral fiber or gypsum plaster board core lined with galvanised and primed and painted sheet metal facing 1.5mm thick both sides, hinge plate, hinges, 2.0mm thick galvanised, primed and painted corner covering frames, fire proofing strips, all to DIN 4102, DIN 52210, DIN 18095				
	<b><u>Double Doors</u></b>				
1	Cylindrical floor mounted door stop as Dorma Cat. No. DDS-SS-021 or any other equal and approved in matt stainless steel finish	No	9		
	<b><u>Duct Doors</u></b>				
2	60 Minute double leaf door leaf (FD60s) size 900 x 2100mm as Andreu DHTU(Assa Abbloy)) or any other equal and approved	No	8		
	<b><u>Fire Escape Doors</u></b>				
3	60 Minute double leaf door leaf (FD60s) size 1000 x 2100mm as Andreu DHTU(Assa Abbloy)) or any other equal and approved complete with escape exit hardware for single leaf steel door leaf comprising 2 point vertical locking device, push bar and cylinder locking outside access all to conform to BS EN 1634-1 and BS 1125 Annex A19, and BS 5499	No	4		
4	Fire escape door sign overall size 150 x 150 x 1.5mm thick in matt stainless steel and with universal "Fire escape" symbol for screw fixing	No	4		
	<b>Carried Forward to Summary of Section No. 1</b>			KES	
	Section No. 1 Bill No. 2 FIRE RATED DOORS				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO. 3</u></b>				
	<b><u>WALLING</u></b>				
	<b><u>BLOCKING OF EXISTING WINDOW OPENING</u></b>				
	<u>The following in mild steel, welded, primed and ready for painting; allow for connection to concrete beams and or roof trusses</u>				
1	50 x 50 x 3mm Thick square hollow section member	m	180		
2	4mm Thick mild steel plate welded to steel frame (measured separately)	m2	90		
	<u>Prepare surface, prime with primer, prepare and spray paint two finishing coats "Jotun Fenomastic Pure Colours Enamel Matt" or any other equal and approved enamel paint</u>				
3	Metal surfaces girth exceeding 100mm but not exceeding 200mm	m	180		
4	General metal surfaces	m2	90		
	<b><u>WALL LINING AND INFILLS</u></b>				
	<u>Gypsum sandwich panel BS 1230 or other equal and approved</u>				
5	supply and install 150mm thick by 3000mm high gypsum board sandwich partition: comprising 4x12mm thick gypsum board with rhinoboad soundblock; 2hr fire rated/RW 54dB;50mm rockwool infill, 1.2mm thick galvanised sheet metal lining in between; bevelled edges and skimmed joints only; standard frame including 25mm ultra steel track; sound seal bead; stainless steel section to receive skim; include three coats fire rated paint'; to architects detail as per details	m2	350		
6	prepare internal wall surfaces and apply 3 coats fire rated emulsion paint	m2	800		
	<b>Carried Forward</b>			KES	
	Section No. 1 Bill No. 3 INTERNAL WALL AND FINISHES				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES	
	<u>Prepare and apply three coats fire rated emulsion paint</u>				
7	Supply and install grilles composed of 5 no 50x50x3mm main members at 2.5m c/c and intermediary members as 20x20x1.5mm all upto 3m high with 50x25mm x1.5mm crossmembers a per architects detail all primed and painted to finish complete with 2 no Access Double doors as 2000mm wide x2400mm high	m2	60		
<b><u>INTERNAL WALL FINISHES</u></b>					
8	Existing concrete soffits	m2	1,200		
<b><u>INTERNAL CEILING FINISHES</u></b>					
9	Prepare plaster surfaces, prime, skim with <i>Jotun Fenomastic Stucco</i> to approval, prepare and apply three coats of "Jotun Durosan 02 matt" or equal and approved silk vinyl emulsion paint on existing ceiling internally	m2	1,100		
	<u>Supply and fix 600 x 600 x 18mm "Armstrong Altima DB" or any other equal and approved semi recessed suspended ceiling complete with white perimeter trims, curved trims as necessary anchored on pre tensioned metal suspension cabling, wall join angles or shortened grid elements,all to manufacturer's printed instructions and to architect's approval.</u>				
10	Ceiling soffits with suspension height not exceeding 600mm	m2	320		
	<u>Gypsum suspended ceiling finishes, horizontal and sloping ceilings all included</u>				
11	supply and install 12mm thick gypsum plasterboard ceiling with and including all necessary pressed metal brandering system, all bulkheads and light fittings outlets	m2	120		
<b>Carried Forward</b>				KES	
Section No. 1 Bill No. 3 INTERNAL WALL AND FINISHES					

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	<b>Brought Forward</b>			KES	
12	<u>Moulded cornices</u>  100mm thick moulded cornices with and including three labours and other decorations to Architect's approval	m	200		
	<b>Carried Forward to Summary of Section No. 1</b>			KES	
	Section No. 1 Bill No. 3 INTERNAL WALL AND FINISHES				

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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO. 4</u></b>				
	<b><u>RAISED STRUCTURAL ACCESS FLOORING</u></b>				
1	300mm High anti-static, Bergvik or equal and approved fireproof dynamic Iso raised access floor system comprising 600 x 600mm gravity laid high density laminated chipboard panels fully bonded and encapsulated with and including casing of corrosion-resistant galvanised steel, complete with steel grid rail substructure consisting of 80 x 40mm tubular beam sections and pedastal supports, air grilles, seismic bracing, electrostatic grounding and any other necessary accessories (Minimum Rating: 10 kN/m2 uniformly distributed load and 5 kN point load)	m2	180		
	<b>Carried Forward to Summary of Section No. 1</b>			KES	
	Section No. 1 Bill No. 4 RAISED FLOORING SYSTEM				



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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:5</u></b>				
	<b><u>FLOOR FINISHES</u></b>				
	<u>Cement and sand (1 : 4 ) screed</u>				
1	75mm thick screeding to make levels	m2	360		
2	25mm thick quick drying screed to receive tiling	m2	360		
	<u>600x600mm Granito Floor Tiles</u>				
3	Supply and fix 600x600x10mm granito floor tiles as "RAK Ceramics" or other equal and approved to floors on prepared beds (m.s) with proprietary adhesive; jointed and pointed in matching coloured proprietary grouting complete with and including including pvc spacers and expansion joint as necessary	m2	130		
4	100mm high skirting	m	50		
5	provide for sanding /grinding and installation of 2 coat epoxy floor finish	m2	400		
	<b>Carried Forward to Summary of Section No. 1</b>			KES	
	Section No. 1 Bill No. 5 FLOOR FINISHES				

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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:6</u></b>				
	<b><u>WINDOWS BLINDS</u></b>				
1	supply and fix horizontal motorised sheer Window blinds complete with all accessories to architects approval	m2	100		
	<b>Carried Forward to Summary of Section No. 1</b>			KES	
	Section No. 1 Bill No. 6 WINDOWS BLINDS				

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO: 7</u></b>				
	<b><u>FURNITURE &amp; FITTINGS INSTALLATIONS</u></b>				
	<b><u>Control room consoles</u></b>				
	<u>All furniture to comply with UNE-EN ISO 11064 ( Ergonomic design for control centres). Price to include sourcing,purchase handling,All applicable Duty ,local transport and storage upto installation on site</u>				
1	(provide a prime cost rate of ksh 500,000 per unit . tenderer to add cost of importation , handling , delivery and installation on site)1800x850mm anodized Control room console tables as V-concept to comply with UNE-EN ISO 11064 to include the following features, Emergency LED lighting system,Dual 19 inch lateral upright data Access,Concealed Equipment Cabin with Rear Door Access, fLexible dual monitor intergration, Inbuilt cable duct with 3 no power outlets,2no CAT 5 Data outlets, 1no VGA outlet and 2 no standard USB ports	No	13		
	<u>Seats</u>				
2	(provide a prime cost rate of ksh 150,000 per unit . tenderer to add cost of importation , handling , delivery and installation on site)supply and install Orthopedic mid-back synthetic leather Ergonomic chairs with Lumbar back support, Height adjustable seat , head and arm rests complete with chrome supports and wheels	No	13		
	<u>Cabinets</u>				
3	(provide a prime cost rate of ksh 75,000 per unit . tenderer to add cost of importation , handling , delivery and installation on site) supply and install anodized alluminium storage cabinet comprising of 1200mm long x600mmx2100mm high 9 no open shelves complete with furniture and fixtures all to details and architects approval	No	5		
	<b>Carried Forward</b>			KES	
	Section No. 1 Bill No. 7 FURNITURE				



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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:8</u></b>				
	<b><u>SIGNAGES</u></b>				
	<u>Supply, deliver and install the following Signages including all the necessary fittings.</u>				
	<b><u>Power Rooms</u></b>				
1	Signage " Electrical hazard authorised personnel only" sign, heavy duty plastic adhesive material with dimensions 200 x 125mm (LXW) as directed by the engineer	No	8		
2	Signage" Electrical equipment do not extinguish with water" signs , heavy duty plastic adhesive material with dimensions 200 x 125mm (LXW) as directed by the engineer	No	8		
3	Signage " Push bar to open" signs on the fire exit doors, heavy duty plastic adhesive material with dimensions 300 x 100mm (LXW)as directed by the engineer.	No	6		
4	Signage " Keep clear fire exit only" signs on the fire exit doors, heavy duty plastic adhesive material with dimensions 300 x 100mm (LXW)as directed by the engineer.	No	6		
5	Etched aluminium signage indicating room names and numbers, 360 X 140mm (LXW)as directed by the engineer.	No	8		
	<b><u>Whitespace</u></b>				
6	Signage " Authorised personnel only" signs , heavy duty plastic adhesive material with dimensions 400 x 240mm (LXW) as directed by the engineer.	No	1		
	<b>Carried Forward</b>			KES	
	Section No. 1 Bill No. 8 LABELS AND SIGNAGE				

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<b>Brought Forward</b>				KES	
7	Signage " Push bar to open" signs on the fire exit doors, heavy duty plastic adhesive material with dimensions 300 x 100mm (LXW)as directed by the engineer.	No	1		
8	Signage " Fire door keep shut" signs on the fire exit doors, heavy duty plastic adhesive material with dimensions 2x75 x 100mm (LXWxH)as directed by the engineer.	No	1		
9	Etched aluminium signage indicating room names and numbers, 360 X 140mm (LXW)as directed by the engineer.	No	1		
<b><u>Corridors</u></b>					
10	Signage " Fire exit Left/Right" signs , heavy duty plastic adhesive material with dimensions 180 x 240mm (LXW) as directed by the engineer	No	5		
11	Signage " Fire Alarm call point" signs , heavy duty plastic adhesive material with dimensions 100 x 150mm (LXW) as directed by the engineer	No	5		
12	Signage " Fire action" signs , heavy duty plastic adhesive material with dimensions 125 x 200 (LXW) as directed by the engineer	No	5		
<b><u>Telco &amp; Server Rooms</u></b>					
13	Signage " Authorised personnel only" sign, heavy duty plastic adhesive material with dimensions 400 x 240mm (LXW) as directed by the engineer	No	3		
<b>Carried Forward</b>				KES	
Section No. 1 Bill No. 8 LABELS AND SIGNAGE					

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<b>Brought Forward</b>				KES	
14	Signage " Fire exit" sign, heavy duty plastic adhesive material with dimensions 2 X 300 x 100mm (LXWXH) as directed by the engineer	No	3		
15	Signage " Fire door keep shut" sign, heavy duty plastic adhesive material with dimensions 4 x 75 x 100mm(LXWXH) as directed by the engineer	No	3		
16	Etched aluminium signage indicating room names and numbers, 360 X 140mm (LXW)as directed by the engineer.	No	3		
<b><u>Fire Suppression Rooms</u></b>					
17	Signage " Authorised personnel only" sign, heavy duty plastic adhesive material with dimensions 400 x 240mm (LXW) as directed by the engineer	No	1		
18	Signage " Fire action" sign, heavy duty plastic adhesive material with dimensions 150 x 250mm (LXW) as directed by the engineer	No	1		
19	Etched aluminium signage indicating room names and numbers, 360 X 140mm (LXW)as directed by the engineer.	No	1		
<b><u>Generator Room</u></b>					
20	Etched aluminium signage indicating room names and numbers, 360 X 140mm (LXW)as directed by the engineer.	No	1		
21	Signage " Risk of fire, no smoking, no open flames" sign, heavy duty plastic adhesive material with dimensions 200 x 100mm (LXW) as directed by the engineer	No	2		
<b>Carried Forward</b>				KES	
Section No. 1 Bill No. 8 LABELS AND SIGNAGE					

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<b>Brought Forward</b>				KES		
22	Signage " Spillage must be clean up immediately" sign, heavy duty plastic adhesive material with dimensions 150 x 200mm (LXW) as directed by the engineer	No	2			
23	Signage " Do not enter authorised personnel only" sign, heavy duty plastic adhesive material with dimensions 200 x 100mm (LXW) as directed by the engineer	No	3			
<b><u>Fuel Tank Room</u></b>						
24	Etched aluminium signage indicating room names and numbers, 360 X 140mm (LXW) as directed by the engineer.	No	1			
25	Signage " Risk of fire, no smoking, no open flames" sign, heavy duty plastic adhesive material with dimensions 200 x 100mm (LXW) as directed by the engineer	No	1			
26	Signage " Spillage must be clean up immediately" sign, heavy duty plastic adhesive material with dimensions 150 x 200mm (LXW) as directed by the engineer	No	1			
<b>Carried Forward to Summary of Section No.</b>						
<b>1</b>				KES		
Section No. 1						
Bill No. 8						
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Bill No	<u>SECTION SUMMARY - BUILDERS WORKS</u>	Page No	Amount
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3	INTERNAL WALL AND FINISHES	6	
4	RAISED FLOORING SYSTEM	7	
5	FLOOR FINISHES	8	
6	WINDOWS BLINDS	9	
7	FURNITURE	11	
8	LABELS AND SIGNAGE	15	
	<b>Carried to Final Summary</b>		KES
	Section No. 1		

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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:2</u></b>				
	<b><u>BILL NO:1</u></b>				
	<b><u>DEMOLITIONS</u></b>				
1	<p><b><u>Notes:</u></b>  <b><u>contractor to allow for all temporary protection of works required during demolition including ordinary and special dust screens, hoarding , barriers, warning signs etc as directed by the Architect and as necessary for the protection of the existing structure.all such devices shall be removed upon completion of all works</u></b></p> <p><b><u>All usable materials arising from demolitions shall remain the property of the client but the contractor may take away any materials not so required by the client and shall allow for a credit for such materials that may be reusable. All debris arising from there shall be carried away and properly disposed following all government protocols</u></b></p> <p><u>Wall Partition</u></p>			SUM	
2	Demolish masonry walling sizes 200mm and 150mm make good surfaces and allow for carting away from site and disposal	m2	50		
3	Demolish timber/glass partitions store and allow for carting from site and disposal	m2	100		
4	Demolish Aluminium Doors and allow for carting from site and disposal	No	20		
5	Demolish 250mm wide trunking make good surfaces and allow for carting from site and disposal	m	100		
	<u>Floor Finishes</u>				
6	Carefully remove existing Ceramic floor tiles and allow for carting away from site and disposal	m2	360		
	<b>Carried Forward</b>			KES	
	Section No. 2 Bill No. 1 DEMOLITIONS - BUILDERS WORKS				

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<b>Brought Forward</b>				KES	
7	Carefully remove existing raised floor system and allow for carting away from site and disposal	m2	360		
8	Prepare surface to receive New floor finish (measured separately)	m2	480		
	<u>Furniture and fixtures</u>				
9	carefully remove existing storage cabinets and plumbing fixtures and allow for carting away and disposal			SUM	
	<u>ceiling</u>				
10	carefully suspended acoustic ceiling allow for carting away and disposal	m2	450		
<b>Carried Forward to Summary of Section No. 2</b>				KES	
Section No. 2					
Bill No. 1					
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Item No		Unit	Quantity	Rate	Amount
1	<p><b><u>BILL NO:2</u></b></p> <p><b><u>Bidders are expected to visit and ascertain site conditions prior to pricing this section. No claims will be entertained whatsoever</u></b></p> <p>Carefully remove and handover the following items to the Client against a signed inventory:</p> <p><b>Communication Room 1:</b></p> <ul style="list-style-type: none"> <li>• 2No. Ventilation Grilles and associated ductwork</li> <li>• 1No. fire detector and associated wiring</li> <li>• 1No. Air-conditioning unit complete with outdoor unit and accessories</li> <li>• 1No. fire suppression nozzle and associated pipework</li> <li>• 1No. motion sensor</li> <li>• 1 No. Lighting fixtures and associated wiring</li> </ul> <p><b>Communication Room 2:</b></p> <ul style="list-style-type: none"> <li>• 1No. Ceiling cassette air-conditioning equipment complete with outdoor and accessories.</li> <li>• 1No. fire detector and associated wiring</li> <li>• 2No. Free standing air-conditioning equipment complete with outdoor and accessories.</li> <li>• 2No. Ventilation Grilles and associated ductwork</li> <li>• 1No. fire suppression nozzle and associated pipework</li> <li>• 3No. ceiling mounted surveillance cameras and associated wiring</li> <li>• 2No. fire detector and associated wiring</li> <li>• Access control system and associated wiring at the door.</li> <li>• 4 No. wall mounted panels for access control system</li> <li>• 2No. electrical consumer units wall mounted and associated cabling</li> </ul> <p style="text-align: right;"><b>Carried Forward</b></p> <p>Section No. 2            Bill No. 2            DEMOLITIONS - MEP SERVICES</p>				
				KES	

	<p><b>Brought Forward</b></p> <ul style="list-style-type: none"> <li>• 1 No. Lighting fixtures and associated wiring</li> </ul> <p><b>Main Corridor</b></p> <ul style="list-style-type: none"> <li>• 3 No. Lighting fixtures and associated wiring</li> <li>• 1No. fire detector and associated wiring</li> <li>• 2No. fire suppression nozzle and associated pipework</li> <li>• 1No. ceiling mounted surveillance cameras and associated wiring</li> <li>• 8 No. wooden ductdoors</li> </ul> <p><b>Computer Room</b></p> <ul style="list-style-type: none"> <li>• 3 No. Precision Air-conditioning equipment free standing complete with outdoor and accessories.</li> <li>• 6No. Ceiling cassette air-conditioning equipment complete with outdoor and accessories.</li> <li>• 5 No. Air-conditioning equipment free standing complete with outdoor and accessories.</li> <li>• 3No. Ventilation Grilles and associated ductwork</li> <li>• 10 No. Lighting fixtures and associated wiring</li> <li>• 10No. fire detector and associated wiring</li> <li>• 4No. ceiling mounted surveillance cameras and associated wiring</li> <li>• 3No. fire suppression nozzle and associated pipework</li> <li>• 4No. Electrical free standing power boards and associated cabling</li> <li>• Access control system and associated wiring at the door.</li> </ul> <p><b>UPS Room 2</b></p> <ul style="list-style-type: none"> <li>• 3 No. Lighting fixtures and associated wiring</li> <li>• 2No. Battery Racks complete with cabling and Batteries</li> <li>• 2No. UPS Equipment complete with cabling</li> <li>• 1No. Isolation Transformer complete with cabling</li> </ul>			KES	
	<p><b>Carried Forward</b></p> <p>Section No. 2  Bill No. 2  DEMOLITIONS - MEP SERVICES</p>			KES	

	<p><b>Brought Forward</b></p> <ul style="list-style-type: none"> <li>• 2No. Electrical free standing power boards and associated cabling</li> <li>• 8No. Electrical wall mounted power boards and associated cabling</li> <li>• 1No. Ceiling cassette air-conditioning equipment complete with outdoor and accessories.</li> <li>• 1No. High wall mounted air-conditioning equipment complete with outdoor and accessories.</li> <li>• 1No. fire suppression nozzle and associated pipework</li> <li>• 1No. fire detector and associated wiring</li> <li>• 1No. Ventilation Grilles and associated ductwork</li> <li>• Access control system and associated wiring at the door.</li> </ul> <p><b>UPS Room 1</b></p> <ul style="list-style-type: none"> <li>• 3 No. Lighting fixtures and associated wiring</li> <li>• 2No. Battery Racks complete with cabling and Batteries</li> <li>• 2No. UPS Equipment complete with cabling</li> <li>• 1No. Electrical free standing power boards and associated cabling</li> <li>• 1No. Ceiling cassette air-conditioning equipment complete with outdoor and accessories.</li> <li>• 1No. High wall mounted air-conditioning equipment complete with outdoor and accessories.</li> <li>• 1No. fire suppression nozzle and associated pipework</li> <li>• 1No. fire detector and associated wiring</li> <li>• 1No. Ventilation Grilles and associated ductwork</li> <li>• Access control system and associated wiring at the door.</li> </ul> <p><b>IT Office</b></p> <ul style="list-style-type: none"> <li>• 10 No. Lighting fixtures and associated wiring</li> <li>• 2No. fire suppression nozzle and associated</li> </ul>			KES	
	<p><b>Carried Forward</b></p> <p>Section No. 2  Bill No. 2  DEMOLITIONS - MEP SERVICES</p>			KES	

	<p style="text-align: right;"><b>Brought Forward</b></p> <p>pipework</p> <ul style="list-style-type: none"> <li>• 10No. fire detector and associated wiring</li> <li>• 4No. ceiling mounted surveillance cameras and associated wiring</li> </ul> <p><b>Entry Room</b></p> <ul style="list-style-type: none"> <li>• 1 No. Lighting fixtures and associated wiring</li> <li>• Access control system and associated wiring at the door.</li> </ul> <p><b>Fire Suppression Room</b></p> <ul style="list-style-type: none"> <li>• 17No. fire suppression cylinders</li> <li>• 1 No. Lighting fixtures and associated wiring</li> <li>• Access control system and associated wiring at the door.</li> </ul>				KES	
			Item			
	<p><b>Carried Forward to Summary of Section No. 2</b></p> <p>Section No. 2                  Bill No. 2                  DEMOLITIONS - MEP SERVICES</p>				KES	

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	<b><u>BILL NO:3</u></b>				
1	Switch off and disconnect from power and external batteries the existing 60KVA Gamatronics UPS and relocate it in the new location within the same floor as shall be directed by the Engineer.		Item		
2	Move the respective batteries and battery rack to the above UPS including the battery rack to the new location as shall be directed by the Engineer		Item		
3	Reinstall the UPS equipments and connect to the AC 415V, 50Hz existing Power board breaker in the original supply Board		Item		
4	Reinstall the batteries in the original configuration and terminate the input to the UPS equipment using the existing breakers and cables		Item		
5	Supply a new 70sq.mm 3 core cable to connect the UPS to the existing breaker in the UPS input Power supply Board and from the UPS to the UPS existing breaker in the UPS output Power Board.	m	100		
6	Cable glands for CU cables above	No	4		
7	Cable lugs for CU cables above complete with hydraulic crimping	No	12		
8	Carry out testing and on satisfactory start up of the UPS recommission the UPS into service		Item		
	<b>Carried Forward to Summary of Section No. 2</b>			KES	
	Section No. 2 Bill No. 3 TEMPORARY WORKS				



Bill No	<u>SECTION SUMMARY - DEMOLITIONS AND TEMPORARY WORKS</u>	Page No		Amount	
1	DEMOLITIONS - BUILDERS WORKS	18			
2	DEMOLITIONS - MEP SERVICES	22			
3	TEMPORARY WORKS	23			
	<b>Carried to Final Summary</b>			KES	
	Section No. 2				

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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:3</u></b>				
	<b><u>BILL NO:1</u></b>				
1	<p><b>Supply, delivery and Installation at site, Testing &amp; Commissioning 350KVA, 50HZ, 400V, turbo-charged, electric start, water cooled, <b>Continuous running diesel generator complete with heat exchangers.</b></b></p> <p>The Generator shall be sound proof type, sound pressure level 81.8dBA @1mtrs, 70,6dBA @7mtrs and 64.6dBA@15mtrs. The engine shall be rigidly coupled to a self regulating alternator with necessary instrumentation controls mounted on the set. The set is to be fitted with the following:-</p> <ul style="list-style-type: none"> <li>• Integrated base tank to manufacturer's standard.</li> <li>• Generator exhaust system comprising of horizontal black mild steel pipe with line silencer and vertical section terminating in a goose neck to the set and shall be the residential type.</li> <li>• Allow for the extension of the generator exhaust by 20mtrs.</li> <li>• Spare parts/consumables for 5000hrs operation.</li> </ul>	No	2		
2	<p><b>PLC Master controller panel</b></p> <p>Supply, delivery and installation at site, Testing &amp; Commissioning of PLC Master Controller panel.</p> <p>The Master Controller panel should be Stand alone, FTTA, modular, metal clad, cubicle pattern to IP42 rating, Form 2b separation.</p> <p>The panel should comprise of termination point for connection of remote signals required.</p> <p>The panel should comprise of digital energy multimeter (complete with current transformers and fuse holder/fuses for indication of current, voltage, kW, etc.</p> <p>MUST be BMS compatible and interface modules for</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 3  Bill No. 1  GENERTOR EQUIPMENT</p>				

	<b>Brought Forward</b>			KES	
	<p>MODBUS (RTU) link incorporated to monitor as a minimum the following: mains available, mains on load, generator available, generator on load, voltage, current, kW, kWh, KVA power factor etc</p> <p>The panel should comprise the following:</p> <p><b>Logic/Circuitry</b>  Monitoring unit for automatically matching generator frequency and voltage levels with that of the bus.</p> <p>A synchroniser unit for sending the closing command to the breaker on the generator paralleling board.</p> <p>Synchroniser check logic circuitry for performing the progressive function of verifying voltage and phase angle conditions and ensuring that they are within preset limits, before allowing the breaker(s) to close and any other necessary circuitry and programming for proper operation.</p> <p>Should be provided with control switches in the front panel for manual option of raising and lowering of speed and voltage of the generator to match the bus frequency and voltage before synchronizing. Should have volt meters and meters in the device that offer generator and bus measurements. To operate such that the various generators pick or release each at a time or in multiples progressively depending on the actual load demand.</p> <p><b>Synchronization operation</b>  Should operate such that in event of mains outage, all the generator sets should come on simultaneously and the output synchronised before transfer to the paralleling panel/load.</p> <p>Load transfer then takes place using load tamping to suit the actual demand and only the generator(s) required for that particular load are left running. This should operate in the following manner;</p> <p>i) when there is power failure, all generators come</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 3  Bill No. 1  GENERTOR EQUIPMENT</p>				

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<p style="text-align: right;"><b>Brought Forward</b></p> <p>on  ii) when load is determined, some generators shut down as the load dictates.  iii) transfer of load to an additional generator will happen when the current generator running load goes greater than 80% of the running combined generators rating.  iv) when the load reduction is observed and is consistent for a period of 10minutes, then the shut down of the generator can occur as stated above</p> <p>The engagement/disengagement of any/all generators should be seamless in power supply to the load.</p> <p>Upon mains resumption, the panel first synchronise the generator output to the mains bus and the pull off seamlessly from the load such that no outage is experienced. This means that we should have only one outage during mains outage but none on resumption.</p> <p>Program to follow the 2N topology and meet the Tier III- online maintenance requirement</p> <p>Batteries and charger; Internal connection and providing materials.</p>			KES	
<p style="text-align: right;"><b>Carried Forward</b></p> <p>Section No. 3  Bill No. 1  GENERTOR EQUIPMENT</p>	No	2	KES	

3	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>GENERATOR CONTROL PANEL</b></p> <p>The control panel shall interface engine functions with generator functions.</p> <p>The Control panel will be connected to engine/generator sensors, engine electronic control module and other control components by means of a connection box. The connection box also house timers, relays and other electronic system components.</p> <p>In this configuration Generator Set (A) and Generator Set (B) are the primary generators.</p> <p>If one of the primary generators fails or needs service, Generator (C) can brought on line and paralleled with the load. This can be a completely automated function. Below is a list of common events:</p> <p>Generators Configured for Parallel Operation  When main power is lost and Generator Set (A) fails during operation, the following events occur:  Automatic transfer switch signals HMI panel to initiate startup of Generator Set (A) and Generator Set (B) via generator operator panels.  HMI panel monitors primary generator sets operations and parallels them into system operation.  Switch panels distribute emergency power as designated.  Generator Set (A) has active shutdown warning.  HMI panel initiates startup of Generator Set (C), Generator Set (A) is removed from configuration and cool-down/shutdown operation is performed.  HMI panel parallels Generator Set (C) with Generator Set (B), monitors system load and alarm condition for online generators.  When main power is available, automatic transfer switch disconnects generator set and connects to main power grid.  HMI Panel signals Generator Set (B) and Generator Set (C) operator panel to perform cool down/shutdown operations.</p> <p style="text-align: right;"><b>Carried Forward</b></p>			KES	
		No	2		
	<p>Section No. 3  Bill No. 1  GENERTOR EQUIPMENT</p>			KES	

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	<b>Brought Forward</b>			KES	
4	Provide the following control cables for the PLC Master controller:- <ul style="list-style-type: none"> <li>• 19Cx1.5mm Control cable for reday, common shutdown, remote start input</li> <li>• 4Cx1.5mm Control cable for Generator CB close signal</li> <li>• 4Cx1.5mm control cable for Generator CB open signal</li> <li>• 4Cx1.5mm control cable for Split board CB close signal</li> <li>• 4Cx1.5mm control cable for Split board CB open signal</li> <li>• 19Cx1.5mm control cable for utility CB RTN</li> <li>• 4Cx0.75mm (shielded) communication cable</li> <li>• 2Cx1.5mm (shielded) communication cable</li> </ul>	Item			
	<b>Carried Forward to Summary of Section No. 3</b>			KES	
	Section No. 3 Bill No. 1 GENERTOR EQUIPMENT				

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Item No		Unit	Quantity	Rate	Amount
1	<p><b><u>BILL NO:2</u></b></p> <p><b><u>Tank Filling Point</u></b></p> <ul style="list-style-type: none"> <li>• Product- Diesel</li> <li>• 75mm fitting</li> <li>• 50mm high level float set</li> <li>• pad mountable, open construction pumpset with weatherproof and lockable fill box with 7 gallon spill containment sump and weatherproof and lockable control box</li> <li>• Quick disconnect hose coupling with dust plug</li> <li>• Inlet shutoff valve</li> <li>• Check valve</li> <li>• Outlet shutoff valve</li> <li>• Line purging valve</li> <li>• Spill sump drain valve</li> <li>• High capacity transfer pump 500 L/min</li> <li>• Automatic controller, described below</li> <li>• Ground stud</li> </ul> <p><b>Controller Includes:</b></p> <ul style="list-style-type: none"> <li>• High level floatset for installation in 2" tank fitting minimum</li> <li>• Tank Full visual alarm</li> <li>• High Level visual alarm •</li> <li>• Tank Leak alarm</li> <li>• Audible alarm horn activated by alarms above</li> <li>• Power Available indicator</li> <li>• Control Power On-Off switch</li> <li>• Pump Start/Stop push-buttons</li> <li>• Top-off/hose drain mode push-button</li> <li>• Pump starter</li> <li>• Type 3R control enclosure (fuel oil version)</li> </ul>	No	2		
	<b>Carried Forward</b>			KES	
	<p>Section No. 3            Bill No. 2            FUEL STORAGE SYSTEM</p>				

<b>Brought Forward</b>				KES
2	<p><b><u>Bunded Fuel Tanks</u></b></p> <p>5,000 Litres Net Usable self bunded Above Ground Fuel Tanks:</p> <ul style="list-style-type: none"> <li>• Designed to AS 1940</li> <li>• Built to AS1693, CAT-3</li> <li>• Baffled Internally</li> <li>• White colour</li> <li>• 6mm Steel Self Bunded double wall construction</li> <li>• Galvanized lifting lugs</li> <li>• Set of statutory signage</li> <li>• Lockable Inspection/fitting chamber with gas filled hinge support</li> <li>• 1x 32mm fill port with filter</li> <li>• 1x40mm supply port</li> <li>• 2x50 mm return port</li> <li>• 1x Air Breather Vents</li> <li>• 2x Anodized dipstick</li> </ul>	No	2	
3	<p><b><u>Fuel Polishing Equipment</u></b></p> <ul style="list-style-type: none"> <li>• 40 Liters/Min Pump and motor</li> <li>• 230V Single Phase, 50HZ Power Supply</li> <li>• Strainer, 100 mesh</li> <li>• Pre filter, 10 micron</li> <li>• Final Filter, 2 micron</li> <li>• Water separator, 5ppm</li> <li>• UL 508 Digital PLC based controller, Network compatible</li> <li>• UL508 Analogue Level Controller</li> <li>• Closed secondary containment</li> <li>• Powder coated external finish</li> </ul>	No	2	
4	<p><b><u>Vapour Recovery Vents</u></b></p> <p>Class 'C' Galvanized Iron pipe 50mm diameter</p>	m	20	
5	Vapour Recovery Vents	No	2	
<b><u>Pipe Works and Fittings</u></b>				
<b>Carried Forward</b>				KES
<p>Section No. 3            Bill No. 2            FUEL STORAGE SYSTEM</p>				



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Brought Forward				KES	
<b><u>Product Pipes (Pressurized System)</u></b>					
<b><u>Pipework</u></b> <b><u>(Provisional subject to remeasurement)</u></b>					
Supply and Install Stainless Steel Pipework					
6	25mm diameter	m	100		
7	25mm diameter elbow	No	15		
8	25mm Hose pipe for final delivery	m	30		
9	50mm Diameter	m	100		
<b><u>Fittings and Accessories for above</u></b>					
10	25 mm Isolating Valves	No	20		
11	25 mm Non Return Valves	No	10		
<b><u>Fuel Pumps</u></b>					
12	Diesel transfer electric , displacement, selfpriming, rotary electric vane pumps fitted with bypass valve as 'PIUSI E-80' or an approved equivalent	No	8		
<b>Carried Forward</b>				KES	
Section No. 3 Bill No. 2 FUEL STORAGE SYSTEM					

	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b><u>Automatic Tank Gauging System</u></b></p> <p>13 OPW 1500 Automatic Tank Gauging System or an approved equivalent capable of performing the following functions:</p> <ul style="list-style-type: none"> <li>a) High Product</li> <li>b) Low Product</li> <li>c) High Water</li> <li>d) Theft</li> <li>e) Leak Test Failed</li> <li>f) Leak Test Required</li> <li>g) Generator Usage Reports</li> </ul> <p><b>The system should be able to simultaneously service 2 No. independent Above tanks with a capacity of 5,000 litres each and 2 No. above ground tanks with a capacity of 1000 Litres Each</b></p> <p><b>The pricing should be complete of all the following accessories:</b></p> <ol style="list-style-type: none"> <li>1. Atg cable</li> <li>2. Signal cables</li> <li>3. Calibration of the system e.t.c</li> </ol>			KES	
	<p><b><u>Electrical and Control Mechanism</u></b></p> <p><b><u>Additional Accesories</u></b></p> <p>14 <b>PLC Control Panel</b></p> <p>Level controllers for comprehensive level control, monitoring and protection of pumping systems starting direct-on-line, star delta or as soft starter. Controller should be equipped with configurable input/output terminals, giving full flexibility for all applications.</p> <p>1) Control of 2 pumps based on signals from sensor input (analog, 0-5 V, 0.5-3.5V, 0-10 V, 0- 20 mA, 4-20 mA or digital, float switch)</p>	No	1		
	<p style="text-align: right;"><b>Carried Forward</b></p> <p>Section No. 3                  Bill No. 2                  FUEL STORAGE SYSTEM</p>			KES	

	<p><b>Brought Forward</b></p> <p>2) Support up to five control levels for both analogue level transmitter or float switch operation</p> <p>4) Configurable input/output terminals that can be used as digital input/output, analogue input and Pt 100/1000 inputs for flexible use in the actual application</p> <p>5) Prevent the pumps with anti-seizing from choking or seizing due to limestone build-up or other deposits</p> <p>6) Prevent the mains load when several pumping stations are started up at the same time with power-on delay</p> <p>8) Selection of automatic alarm resetting Setting of stop delays matching the actual operating conditions</p> <p>9) Shows the actual liquid level Alarm indication via build in buzzer</p> <p>10) Power/current measurement</p> <p>11) Capable of Connection to GSM Gateway module</p> <p><b><u>Alarm Indicators:</u></b></p> <p>1) Dry running</p> <p>2) High High, High Low, Low High and Low Low Levels</p> <p>3) Incorrect phase sequences or missing phase</p> <p>4) Sensor inconsistency or failure</p> <p>6) Too many restarts</p> <p>7) Pump overheating and moisture detection</p> <p><b><u>Technical:</u></b></p> <p>Number of pumps: 2</p> <p><b><u>Materials:</u></b></p> <p>Cabinet: Powder Coated</p> <p><b><u>Installation:</u></b></p> <p>Cabinet mounting: Wall mounting</p> <p>Earth connection: N, PE</p>			<p>KES</p>	
	<p><b>Carried Forward</b></p> <p>Section No. 3                  Bill No. 2                  FUEL STORAGE SYSTEM</p>			<p>KES</p>	



Bill No	<u>SECTION SUMMARY - GENERATOR AND FUEL SYSTEM</u>	Page No		Amount	
1	GENERTOR EQUIPMENT	29			
2	FUEL STORAGE SYSTEM	35			
	<b>Carried to Final Summary</b>			KES	
	Section No. 3				

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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:4</u></b>				
	<b><u>BILL NO:1</u></b>				
	<b><u>Earthing</u></b>				
	<b><u>All cables to be as East Africa Cable or approved equivalent</u></b>				
	<b><u>All cables are to be supplied complete with cable lugs, glands, cheats etc</u></b>				
1	1C 120sq.mm Y/G cable from Generator to the Earth Bar	m	20		
2	1C 120sq.mm Y/G from Main LV to Earth Bar	m	10		
3	1C 50sq.mm cable from the UPS Earth Bar to the Equipotential Bar in the UPS Power room A.	m	30		
4	1C 50sq.mm cable Y/G from the UPS Earth Bar to the Equipotential Bar in the UPS Power room B.	m	30		
5	1C 35sq.mm cable Y/G from the White Space to the Equipotential Bar in the white space to accomodate racks, trays, raised floor steel structure etc.	m	10		
6	1C 70sq.mm cable from Air conditioning units to the Earth Bar	No	20		
7	1C 120sq.mm Y/G from Main LV to Earth pits	m	560		
8	Allow for equipontial bonding to all exposed metal work such as cable trays, pipe works, raised floor, racks etc		Item		
9	Forth Floor earth terminal c/w insulators and channelbases. Copper bar to be of 300sq.mm csa minimum	No	5		
10	Third Floor earth terminal c/w insulators and channelbases. Copper bar to be of 300sq.mm csa minimum	No	2		
	<b>Carried Forward</b>			KES	
	Section No. 4 Bill No. 1 EARTHING SYSTEM				



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Item No	Unit	Quantity	Rate	Amount
<p><b><u>BILL NO:2</u></b></p> <p>1 Allow for Kenya power supply connection.                      Principal Sum of Ksh. 5,000,00.00 (Kenya Shillings Five million)only.                      The Contractor shall charge 5% fees of the supply payable amount as liaison and facilitation cost</p>		Item		5,000,000.00
<b>Carried Forward to Summary of Section No. 4</b>				
Section No. 4 Bill No. 2 KPLC NEW SUPPLY CONNECTION				KES



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Item No		Unit	Quantity	Rate	Amount
	<p><b><u>BILL NO:3</u></b></p> <p><b><u>TRUNKING , CABLE LADDERS AND CABLE TRAY INSTALLATIONS</u></b></p> <p>All trunking, cable tray and cable ladder installations pricings shall as a mandatory requirement include all fixing accessories such as bends, dividers, Covers, rawl bolts, brackets, fasteners, anchorages etc. For above ceiling installations, all the such items must be firmly anchored / supported on the structural roof members such that no weight is exerted on the ceilings.This must be included in the rates.</p> <p>Equipotential bonding of all the cable trays &amp; ladders below should be done in 35mm sq single core cables to the main earthing system.</p> <p><b><u>Ground Floor</u></b></p> <p>Cable Trays</p>				
1	<p><b><u>OVERHEAD CABLE TRAYS (ELV SYSTEMS):</u></b>            200 x 50mm galvanised steel factory fabricated perforated Cable tray complete with angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. This should include all brackets / rods for mounting the cable trays.</p>	m	220		
2	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>            300mm x 50mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	25		
	<b>Carried Forward</b>			KES	
	<p>Section No. 4            Bill No. 3            CONTAINMENT SYSTEM</p>				

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<b>Brought Forward</b>				KES	
3	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>  600mm x 50mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	12		
4	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>  600mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	85		
5	<p><b><u>RISER DUCT CABLE LADDER (LV CABLES):-</u></b>  900mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	22		
<b><u>Third Floor</u></b>					
<u>Cable Trays</u>					
6	<p><b><u>OVERHEAD CABLE TRAYS (ELV SYSTEMS):</u></b>  200 x 50mm galvanised steel factory fabricated perforated Cable tray complete with angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. This should include all brackets / rods for mounting the cable trays.</p>	m	70		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
7	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>  600mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	80		
8	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>  900mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p> <p><u>Trunking</u></p>	m	3		
9	<p>200mmx50mm industrial Plastic cable trunking IP40 complete with fitted snap on cover, flat 90 degree conners, flat tees, flat crosses, divider to provide two chambers, screws and nuts, End caps, branch connection elements, straight joints, adjustable joint accessories and wall plastic brackets. Colour grey. The material should be self extinguishing material in compliance with UL 94 VD Standards and resistant to abnormal heat and fire upto 960 degrees centigrade (glow wire test) in compliance with IEC 695-2-Standard.</p> <p>Standard length 3 metres and height 130mm, thickness 1.5mm.  Resistant to atmospheric and chemical (water, saline solution and mineral and oil bases) agents.</p>	m	20		
<b><u>Fourth Floor</u></b>					
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
10	<p><u>Cable Trays</u></p> <p><b>OVER HEAD WIRE MESH TRAY (COPPER DATA CABLES):</b> 300mm X 100mm wire mesh cable trays for Copper Data Cables complete with angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. This should include all brackets / rods for mounting the cable trays.</p> <p>The length of wire mesh cable tray, 2.9 or 3m is recommended.</p>	m	130		
11	<p><b>OVER HEAD YELLOW CABLE TRAY (FIBER CABLES):-</b> 220 x 100mm Fibre Glass trays c/w bends, joiners, end caps, side drop off kit, fibre storage loop offset to detail and to approval. This should include all brackets / rods for mounting the cable trays. The tee offs to the fall to equipment should be 50x50mm. Manufactured as Warren and Brown technologies. Water falls and slacks shall be included in the quote.</p> <p>Note only yellow cable trays by Warren and Brown shall be acceptable.</p>	m	80		
12	<p><b>OVERHEAD CABLE TRAYS (ELV SYSTEMS): -</b> 200 x 50mm galvanised steel factory fabricated perforated cable tray complete with angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. This should include all brackets / rods for mounting the cable trays.</p>	m	160		
13	<p><b>OVERHEAD CABLE LADDER (LV CABLES):-</b> 300mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	40		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
14	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>            450mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	5		
15	<p><b><u>OVERHEAD CABLE LADDER (LV CABLES):-</u></b>            600mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	25		
16	<p><b><u>UNDER RAISED FLOOR CABLE TRAY FOR AIRCON PIPING:-</u></b>            450mm x 100mm deep cable ladder for cabling c/w all angle bends, Tees and end caps to detail and to approval. Includes equipotential bonding. this should have bolted cross members spaced at a maximum distance of 100mm but should be bolted for ease of addition or shifting. Brackets of at least 100mm deep will be used.</p>	m	50		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
17	<p><u>Trunking</u></p> <p>200mmx50mm industrial Plastic cable trunking IP40 complete with fitted snap on cover, flat 90 degree conners, flat tees, flat crosses, divider to provide two chambers, screws and nuts, End caps, branch connection elements, straight joints, adjustable joint accessories and wall plastic brackets. Colour grey. The material should be self extinguishing material in compliance with UL 94 VD Standards and resistant to abnormal heat and fire upto 960 degrees centigrade (glow wire test) in compliance with IEC 695-2-Standard.</p> <p>Standard length 3 metres and height 130mm, thickness 1.5mm. Resistant to atmospheric and chemical (water, saline solution and mineral and oil bases) agents.</p> <p><b>General</b></p> <p><b>Conduiting</b></p> <p><u>Supply, install, HDPE PVC 25mm dia conduits for the following :</u></p>	m	80		
18	<p>Conduiting for lighting and switching points, Installation to include all the conduit work in approved HDPE PVC 25mm dia. conduits including PVC boxes for both pull, junction, end boxes to mount fittings in concealed building fabric.</p>	No	146		
19	<p>Conduiting for access control points, Installation to include all the conduit work in approved HDPE PVC 25mm dia. conduits including PVC boxes for both pull, junction, end boxes to mount fittings in concealed building fabric.</p>	No	100		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
20	Conduiting for wall-mounted Fire alarm device points, Installation to include all the conduit work in approved HDPE PVC 25mm dia. conduits including PVC boxes for both pull, junction, end boxes to mount fittings in concealed building fabric.	No	89		
	<u>Supply, install, HDPE PVC conduits for the following :</u>				
21	Conduiting for desk-mounted data points, Installation to include all the conduit work in approved HDPE PVC 32mm dia. conduits including PVC boxes for both pull, junction, end boxes concealed in floor slab.	No	12		
22	Conduiting for data cables to trunking, Installation to include all the conduit work in approved HDPE PVC 50mm dia. conduits including PVC boxes for both pull, junction, end boxes concealed in floor slab.	No	2		
	<u>Supply, install, galvanised steel 25mm dia. conduits for the following :</u>				
23	Conduiting for ceiling mounted fire alarm devices, Installation to include all the conduit work in approved galvanised steel 25mm dia. conduits including PVC boxes for both pull, junction, end boxes to mount fittings on ceiling slab.	No	86		
24	Conduiting for ceiling mounted Temperature and Humidity sensors, Installation to include all the conduit work in approved galvanised steel 25mm dia. conduits including PVC boxes for both pull, junction, end boxes to mount fittings on ceiling slab.	No	8		
	<u>Supply, install, PVC flex conduits 25mm dia. for the following :</u>				
25	Conduiting for floor void and in-cabinet fire alarm devices, Installation to include all the conduit work in approved PVC Flex 25mm dia. conduits including PVC boxes for both pull, junction, end boxes to mount fittings in boards and under the raised floor.	No	32		
	<b>Carried Forward</b>			KES	
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26	<p style="text-align: right;"><b>Brought Forward</b></p> <p>Conduiting for BMS cables from Cable Trays to field devices in Monitored Panels , Installation to include all the conduit work in approved PVC flex 25mm dia. conduits including PVC boxes for both pull and junction boxes.</p>	No	14	KES	
	<p><b>Carried Forward to Summary of Section No. 4</b></p> <p>Section No. 4          Bill No. 3          CONTAINMENT SYSTEM</p>			KES	



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Item No	Unit	Quantity	Rate	Amount
1				
<b>BILL NO:4</b>				
<b>4AUTOMATIC VOLTAGE STABILIZER:</b>				
Automatic Voltage stabilizer c/w the features outlined in the particular specifications herein. The main specifications of the AVS are:				
i) 400KVA Rated AVS Three Phase with Independent Regulation on each phase				
ii) Input: 415 ± 25% (3P+N) Output: 400 ± 1% (3P+N) C/w all software and hardware necessary for operation. Must be BMS compatible & ready with MODBUS ( RTU ) protocol MODBUS (RTU) compatible Gateway to be supplied in event of different protocol. Should include Enclosed emergency trip push button and associated cabling.				
iii) Operation: Independent correction for each Phase				
v Output: + 1% of 415V/240V				
vi Frequency 50Hz + 1%				
vii. Rated Current: 630 Amps				
viii Admitted Load Variation 0 to 100%				
ix. Admitted Load unbalance up to 100%				
x. Correction Speed:0.65ms/V				
xi. Waveform distortion <0.2%				
xii. Efficiency 98%				
xiii. Cooling: Natural air cooled (free convection without fans)				
xiv. Ambient temperature: -10o C to +40 o C				
xv. Storage temperature: -20o C to +60 o C				
xvi. Relative Humidity: 90% (without ondensate)				
xvii The AVR must be fitted with the following				
a) Digital meter				
b) Surge arrestors for lightening protection				
c) Over/under voltage protection				
d) Thermal relay				
e) Soft start				
f) Reverse phase sequence and phase failure protection.				
g) Tropicalization version				
h) color RAL 7035				
<b>Carried Forward</b>				KES
Section No. 4 Bill No. 4 AUTOMATIC VOLTAGE REGULATOR (AVR)				



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Item No		Unit	Quantity	Rate	Amount
1	<p><b><u>BILL NO:5</u></b></p> <p><b>NEW KPLC METERING SPLIT BOARD</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMING SWITCHGEARS :</b></p> <p>a. 2 No 630 A,415 V, 4P MCCB,65KA Breaking Capacity, with inbuilt Microprocessor based release with suitable CT's. having Overload, Short circuit,Earth fault, and undervoltage release complete as per specification and requirement.</p> <p>b. Space for 1 No. Digital Multi-function Panel Mounted Meter.</p> <p>c. Space for 3 Nos. 630 / 5 Amps. C.T. for metering.</p> <p>d. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>e. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. OUTGOING SWITCHGEARS :</b></p> <p>a. 2 No. - 630 Amp. 36 KA, 4P MCCB with Cu. N- link. with Microprocessor based release with integral overload, short circuit and earth fault protection</p>	No	1		
	<b>Carried Forward</b>			KES	
	<p>Section No. 4            Bill No. 5            POWER BOARDS AND ASOCAITED CABLING</p>				

2	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>STABILIZER BY-PASS PANEL</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMER</b></p> <p>a. 2No. 630 Amps 4P mechanically and electrical interlocked motorised MCCB and associated PLC, with adjustable overcurrent settings, having a short circuit breaking capacity of 36KA at 415Vac, 50Hz.</p> <p>b. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>c. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. 1 No. - 630 Amp. 36 KA, 4P MCCB with Cu. N- link. with Microprocessor based release with integral overload, short circuit and earth fault protection to AVR supply</b></p> <p><b>C. OUTGOING SWITCHGEARS :</b></p> <p>a. 2 No.630Amp 4P MCCB's 36kA with Mechanical (Key) Interlock for bypass switch</p> <p>b. A set of indicators to show the position of the breakers i.e load is on AVR or load is on by-pass.</p>			KES	
3	<p style="text-align: right;"><b>Carried Forward</b></p> <p><b>KPLC MAINS LV CHANGEVER SUPPLY</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b</p> <p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>	No	2	KES	

	<b>Brought Forward</b>			KES	
	<p>separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMING SWITCHGEARS :</b></p> <p>a) 2No. Change Over assemblies of 2No. 630 Amps 4P mechanically and electrical interlocked motorised MCCB and associated PLC, with adjustable overcurrent settings, having a short circuit breaking capacity of 36KA at 415Vac, 50Hz.</p> <p>b) Supply &amp; install control unit for auto-changeover Type UA-1 or equivalent.</p> <p>c) Supply &amp; install phase loss, phase reversal, phase unbalance, under voltage and over voltage faults sensing relay.</p> <p>d) Supply and Install set of indication to show mains supply A Available / In use or Supply B Available / In use.</p> <p>e) Digital Multi-function Panel Mounted power Meter.</p> <p>g) 3 Nos. 630 / 5 Amps. C.T. for power analyser.</p> <p>h) 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>i) 2.5 Sq.mm. Lugged copper Control wires L.S. (v) Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. OUTGOING SWITCHGEARS :</b></p> <p>a). 1No.-630Amp MCCB 50 KA, TP MCCB with Cu. N- link. with Thermal magnetic trip unit.</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>				

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	<b>Brought Forward</b>			KES	
	<p>The sub-board should comprise the following switchgear:</p> <p>The C/O should be such that in event of Mains A power outage, it picks up Mains B if available supply.</p> <p>f) The Sub-board should comprise of an appropriate SURGE ARRESTOR Type 1 and 2 with coordination to breakers to IEC 61643-1 with remote transfer contactor send "end-of-life indication" information as PRD1 25r on incomer.</p>	No	2		
	<b>Carried Forward</b>			KES	
	<p>Section No. 4            Bill No. 5            POWER BOARDS AND ASOCAITED CABLING</p>				

4	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>STABILIZER BY-PASS PANEL</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMER</b></p> <p>a. 2No. 630 Amps 4P mechanically and electrical interlocked motorised MCCB and associated PLC, with adjustable overcurrent settings, having a short circuit breaking capacity of 36KA at 415Vac, 50Hz.</p> <p>b. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>c. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. 1 No. - 630 Amp. 36 KA, 4P MCCB with Cu. N- link. with Microprocessor based release with integral overload, short circuit and earth fault protection to AVR supply</b></p> <p><b>C. OUTGOING SWITCHGEARS :</b></p> <p>a. 2 No.630Amp 4P MCCB's 36kA with Mechanical (Key) Interlock for bypass switch</p> <p>b. A set of indicators to show the position of the breakers i.e load is on AVR or load is on by-pass.</p>			KES	
	<b>Carried Forward</b>	No	2	KES	
	<p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>				

5	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>GENERATOR SPLIT BOARD</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMING SWITCHGEARS :</b></p> <p>a. 1 No 630 A,415 V, <b>4P MOTORIZED MCCB</b>,65KA Breaking Capacity, with inbuilt Microprocessor based release with suitable CT's. having Overload, Short circuit,Earth fault, and undervoltage release complete as per specification and requirement.</p> <p>b. 1 No. Digital Multi-function Panel Mounted Meter.</p> <p>c. 3 Nos. 630 / 5 Amps. C.T. for metering.</p> <p>d. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>e. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. OUTGOING SWITCHGEARS :</b></p> <p>a. 2 No. - 630 Amp. 36 KA, <b>4P MCCB</b> with Cu. N- link. with Microprocessor based release with integral overload, short circuit and earth fault protection</p>			KES	
	<b>Carried Forward</b>	No	2	KES	
	<p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>				



<p style="text-align: right;"><b>Brought Forward</b></p> <p>6</p> <p><b>GENERATOR PARALLELING BOARD</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMING SWITCHGEARS :</b></p> <p>a. 1 No 630 A,415 V, 4P MCCB,65KA Breaking Capacity, with inbuilt Microprocessor based release with suitable CT's. having Overload, Short circuit,Earth fault, and undervoltage release complete as per specification and requirement.</p> <p>b. 1 No. Digital Multi-function Panel Mounted Meter.</p> <p>c. 3 Nos. 630 / 5 Amps. C.T. for metering.</p> <p>d. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>e. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. OUTGOING SWITCHGEARS :</b></p> <p>a. 2 No. - 630 Amp. 36 KA, 4P MCCB with Cu. N- link. with Microprocessor based release with integral overload, short circuit and earth fault protection</p>				KES	
<p>7</p> <p><b>MAIN LV CHANGEOVER SUPPLY</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 800A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p style="text-align: right;"><b>Carried Forward</b></p> <p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>		No	2	KES	

	<b>Brought Forward</b>			KES	
	<p><b>A. INCOMING SWITCHGEARS :</b></p> <p>a) 1No. Change Over assemblies of 2No. 630 Amps 4P mechanically and electrical interlocked motorised MCCB and associated PLC, with adjustable overcurrent settings, having a short circuit breaking capacity of 36KA at 415Vac, 50Hz.</p> <p>b) Supply &amp; install control unit for auto-changeover Type UA-1 or equivalent.</p> <p>c) Supply &amp; install phase loss, phase reversal, phase unbalance, under voltage and over voltage faults sensing relay.</p> <p>d) Supply and Install set of indication to show mains supply Available / In use or generator supply Available / In use.</p> <p>e) Supply and Install set of voltage free normally open/closed contacts for generator start/stop signal.</p> <p>f) Digital Multi-function Panel Mounted power analyser (Note: Power analyser and not just a Meter).</p> <p>g) 3 Nos. 630 / 5 Amps. C.T. for power analyser.</p> <p>h) 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>i) 2.5 Sq.mm. Lugged copper Control wires L.S. (v) Lugged Copper connecting leads. Rating: As required,</p> <p><b>B. OUTGOING SWITCHGEARS :</b></p> <p>a). 1No.-200Amp MCCB 36 KA, TP MCCB with Cu. N- link. with Thermal magnetic trip unit.</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 4            Bill No. 5            POWER BOARDS AND ASOCAITED CABLING</p>				

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<p style="text-align: center;"><b>Brought Forward</b></p> <p>b). 4No. - 160 Amp. 25 KA, TP MCCB with Cu. N- link. with Thermal magnetic trip unit.</p> <p>c) 2No. - 100 Amp. 6 KA, TP MCCB with Cu. N- link. with Thermal magnetic trip unit.</p> <p>d) 1No. - 80 Amp. 6 KA, TP MCCB with Cu. N- link. with Thermal magnetic trip unit.</p> <p>e). A digital energy power analyzer with suitable CT's.and capability to store events and alarms such as micro breakings, voltage dips etc.</p> <p>Note :- All MCCB's shall be provided with rotary operated mechanism and padlocking arrangement.</p> <p>The sub-board should comprise the following switchgear:</p> <p>The MFP should be such that in event of mains power outage, it picks up available supply from the generator Paralleling panel.</p> <p>f) The Sub-board should comprise of an appropriate SURGE ARRESTOR Type 1 and 2 with coordination to breakers to IEC 61643-1 with remote transfer contactor send "end-of-life indication" information as PRD1 25r on incomer.</p>			KES	
<p style="text-align: center;"><b>Carried Forward</b></p> <p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>		No	2	KES

8	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>AIRCON UPS OUTPUT PANEL</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 200A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMER</b></p> <p>a) 2No. 125Amp 3P MCCB, with mechanical key interlock assembly. The MCCBs shall be with have a short circuit breaking capacity of 36KA at 415Vac, 50Hz.</p> <p>a..1 No. Digital Multi-function Panel Mounted Meter.</p> <p>b. 3 Nos. 125 / 5 Amps. C.T. for metering.</p> <p>c. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>d. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>C. OUTGOERS</b></p> <p>a) 9No. 25Amp 3P MCCB, having a short circuit breaking capacity of 6kA at 415Vac, 50Hz.</p> <p>b) 9No. 16Amp 3P MCCB, having a short circuit breaking capacity of 6kA at 415Vac, 50Hz.</p> <p>c) 2No. 10Amp 3P MCCB, having a short circuit breaking capacity of 6kA at 415Vac, 50Hz.</p>			KES	
	<b>Carried Forward</b>	No	1	KES	
	<p>Section No. 4            Bill No. 5            POWER BOARDS AND ASOCAITED CABLING</p>				

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9	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>AIRCON PANEL</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 3b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 200A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMER</b></p> <p>a) 1No. 125Amp 3P MCCB, with a short circuit breaking capacity of 16KA at 415Vac, 50Hz.</p> <p>a..1 No. Digital Multi-function Panel Mounted Meter.</p> <p>b. 3 Nos. 125 / 5 Amps. C.T. for metering.</p> <p>c. 3 Nos. 250V phase Indicating lamp with MCBs.</p> <p>d. 2.5 Sq.mm. Lugged copper Control wires L.S. f. Lugged Copper connecting leads. Rating: As required,</p> <p><b>C. OUTGOERS</b></p> <p>a) 9No. 25Amp 3P MCCB, having a short circuit breaking capacity of 6kA at 415Vac, 50Hz.</p> <p>b) 9No. 16Amp 3P MCCB, having a short circuit breaking capacity of 6kA at 415Vac, 50Hz.</p> <p>c) 2No. 10Amp 3P MCCB, having a short circuit breaking capacity of 6kA at 415Vac, 50Hz.</p>			KES	
	<b>Carried Forward</b>	No	1	KES	
	<p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>				

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10	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>GENERATOR AUXILLIARY BOARD</b></p> <p>Supplying, installation, testing and commissioning free standing panel, FTTA (Fully Type Tested Assemblies), modular, extensible, Form 2b separation with internal arc withstand of 85kA for 0.4s , 500V AC, 50HZ, 100A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMER</b></p> <p>a) 1No. 63Amps 3P MCCB, with overcurrent protection unit with adjustable overcurrent settings, having a short circuit breaking capacity of 10KA at 415Vac, 50Hz.</p> <p><b>B. OUTGOERS</b></p> <p>a) 1No. 32Amp TPN MCCB</p> <p>b) 1No. 32Amp SPN MCB</p> <p>c) 2No. 10Amp SPN MCB</p> <p style="text-align: right;"><b>Carried Forward</b></p>			KES	
		No	2		
	<p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>			KES	

11	<p style="text-align: right;"><b>Brought Forward</b></p> <p><b>GENERATOR AUXILLIARY CHANGEOVER SUPPLY</b></p> <p>Supplying, installation, testing and commissioning Wall mounted panel, Form 2b separation with internal arc withstand of 25kA for 0.4s , 500V AC, 50HZ, 100A rated busbars, comprising:</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p><b>A. INCOMING SWITCHGEARS :</b></p> <p>a) 1No. Change Over assemblies of 2No. 100 Amps 4P mechanically and electrical interlocked motorised MCCB and associated PLC, with adjustable overcurrent settings, having a short circuit breaking capacity of 16KA at 415Vac, 50Hz.</p> <p>b) Supply &amp; install control unit for auto-changeover Type UA-1 or equivalent.</p> <p>c) Supply &amp; install phase loss, phase reversal, phase unbalance, under voltage and over voltage faults sensing relay.</p> <p>d) Supply and Install set of indication to show mains supply A Available / In use or Supply B Available / In use.</p> <p><b>B. OUTGOING SWITCHGEARS :</b></p> <p>a). 1No.-100Amp MCCB 16 KA, TP MCCB with Cu. N- link. with Thermal magnetic trip unit.</p> <p>The sub-board should comprise the following switchgear:</p> <p>The C/O should be such that in event of Mains A power outage, it picks up Mains B if available supply.</p>			KES	
	<b>Carried Forward</b>	No	2	KES	
	<p>Section No. 4            Bill No. 5            POWER BOARDS AND ASOCAITED CABLING</p>				

	<b>Brought Forward</b>			KES	
12	<p><b>DYNAMIC POWER FACTOR CORRECTION AND HARMONIC POWER QUALITY FILTERS AS ABB PQFS or approved equivalent</b></p> <p><b>Electrical Characteristics:</b>                  Connection Method                    3-wire/4-wire                  Network Voltage(+/-10%)            208-480v                  Network frequency                    50Hz +/-5%                  Line current rating per base unit            30A,45A,60A, 70A, 80A,90A, 100A,120A                    Neutral current rating per base unit            3times the line current rating upto 120A                    Modularity                                    Maximum 8 units can be combined.                    Redundancy                                    Master/Slave arrangement                    Equipment losses                            3% of equipment power rating typically</p> <p><b>Filter Characteristics</b>                  Harmonic range                            2nd to 50th order                  Harmonic selectable                    3-wire 20 orders                      4 wire 15 orders                  Harmonic attenuation factor            Better than 97% at rated load                    Reaction time                                Less than 0.5ms instantaneous response.                  Response time                                2 network cycles typically (10-90% filtering)</p> <p><b>Reactive power characteristics</b>                  Target cosQ                                    Programmable from</p>				
	<b>Carried Forward</b>			KES	
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<p style="text-align: right;"><b>Brought Forward</b></p> <p>0.6 inductive to 0.6 capacitive.</p> <p><b>Programming/communication</b>  Digital I/O                      2 digital input/6digital outputs (potential free)  Alarm and Fan contact        1No./No alarm contact and 1No. Fan contact (potential free)  Programming monitoring      Modbus RTU interface</p> <p><b>Certification</b>  CE &amp; CTick</p> <p>Installation</p> <p>Mounting                        Free standing cubicle  Cable entry                      Top</p> <p>IP Protection                    IP30</p> <p>Ambient temperatures        -10 degrees to 40 degrees</p>			KES	
<p style="text-align: center;"><b>Carried Forward</b></p> <p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>	No	2	KES	

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13	<p style="text-align: right;"><b>Brought Forward</b></p> <p>12WAY SPN CONSUMER PANEL IN WHITE SPACE</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP40 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 3No.10Amp SPN MCB 10kA D curve.  b) 7No.6Amp SPN MCB 10kA D curve  c) 2No. TPN Spare Blanks  .</p>			KES	
		No	1		
	<b>Carried Forward</b>			KES	
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	<b>Brought Forward</b>			KES	
14	<p>10WAY SPN CONSUMER PANEL IN SERVER ROOM</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP40 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 2No.10Amp SPN MCB 10kA D curve.</p> <p>b) 6No.6Amp SPN MCB 10kA D curve</p> <p>c) 2No. TPN Spare Blanks</p> <p>.</p>	No	1		
	<b>Carried Forward</b>			KES	
	<p>Section No. 4</p> <p>Bill No. 5</p> <p>POWER BOARDS AND ASOCAITED CABLING</p>				

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15	<p style="text-align: right;"><b>Brought Forward</b></p> <p>12WAY SPN CONSUMER PANEL IN OFFICE AND NOC ROOMS</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP40 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 6No.10Amp SPN MCB 10kA D curve.                  b) 4No.6Amp SPN MCB 10kA D curve                  c) 2No. TPN Spare Blanks                  .</p>				KES	
		No	1			
	<b>Carried Forward</b>				KES	
	Section No. 4 Bill No. 5 POWER BOARDS AND ASOCAITED CABLING					

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16	<p style="text-align: right;"><b>Brought Forward</b></p> <p>10WAY SPN CONSUMER PANEL IN POWER ROOM 3RD FLOOR</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP40 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 2No.10Amp SPN MCB 10kA D curve.                  b) 6No.6Amp SPN MCB 10kA D curve                  c) 2No. TPN Spare Blanks                  .</p>				KES	
		No	1			
	<b>Carried Forward</b>				KES	
	Section No. 4 Bill No. 5 POWER BOARDS AND ASOCAITED CABLING					

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17	<p style="text-align: right;"><b>Brought Forward</b></p> <p>6WAY SPN CONSUMER PANEL IN POWER ROOM 3RD FLOOR</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP32 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 2No.10Amp SPN MCB 10kA D curve.                  b) 2No.6Amp SPN MCB 10kA D curve                  c) 2No. TPN Spare Blanks                  .</p>			KES	
		No	1		
	<b>Carried Forward</b>			KES	
	Section No. 4 Bill No. 5 POWER BOARDS AND ASOCAITED CABLING				

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18	<p style="text-align: right;"><b>Brought Forward</b></p> <p>16WAY SPN CONSUMER PANEL IN GENERATOR ROOM</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP50 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 1No.20Amp SPN MCB 10kA D curve.  b) 1No.10Amp SPN MCB 10kA D curve  c) 10No.6Amp SPN MCB 10kA D curve  d) 4No. SPN Spare Blanks  .</p>			KES	
		No	1		
	<b>Carried Forward</b>			KES	
	<p>Section No. 4  Bill No. 5  POWER BOARDS AND ASOCAITED CABLING</p>				

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<b>Brought Forward</b>				KES	
19	<p>6WAY SPN CONSUMER PANEL IN GENERATOR ROOM</p> <p>Supplying, installation, testing and commissioning Wall mounted Consumer panel.</p> <p>CABLE ENTRY:- TOP Cable entry type</p> <p>INCOMER</p> <p>a) DP32 Amps MCB 10kA D curve.</p> <p>OUTGOERS</p> <p>a) 2No.10Amp SPN MCB 10kA D curve.</p> <p>b) 2No.6Amp SPN MCB 10kA D curve</p> <p>c) 2No. TPN Spare Blanks</p> <p>.</p>	No	1		
20	<p>32A TPN External isolator switch for 3 phase Air Conditioning unit with enclosure as ABB.</p>	No	10		
<p><b>Carried Forward to Summary of Section No. 4</b></p> <p>Section No. 4            Bill No. 5            POWER BOARDS AND ASSOCAITED CABLING</p>				KES	



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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:6</u></b>				
	<b><u>CABLING FOR AC POWER DISTRIBUTION</u></b> <b>Cable</b> <b><u>code shall be CU/XLPE/PVC/SWA/PVC</u></b> <b><u>manufactured to BS EN 8436 Thermosetting</u></b> <b><u>Insulation Operating Temperature 90 degrees</u></b> <b><u>Celsius. Rated voltage 0.6/1KV. (Lugs to be</u></b> <b><u>hydraulically crimped).</u></b>				
	<b><u>All cables are to be supplied complete with lugs,</u></b> <b><u>glands, cheats etc</u></b>				
	<u>4 core 240sq.mm XLPE/SWA/PVC 1000V ac</u> <u>conforming to BS 8436 shall be supplied to connect</u> <u>the following Boards</u>				
1	From Existing Main LV Panel (E05) to Tap-Off Panel (E05-A)	m	20		
2	From Existing Main LV Panel (E05) to Tap-Off Panel (E05-B)	m	20		
3	From Tap-Off panel (E05-A)to AVR By-pass Board 01 (E06)	m	150		
4	From Tap-Off panel (E05-B)to AVR By-pass Board 02 (E11)	m	140		
5	From new KPLC Metering Board (E01) to the the AVR Bypass Board 01 (E06)	m	145		
6	From new KPLC Metering Board (E01) to the the AVR Bypass Board 02 (E11)	m	135		
7	From Generator (E08) to Generator Split Panel(E12)	m	140		
	<b>Carried Forward</b>			KES	
	Section No. 4 Bill No. 6 CABLES AND ASSOCIATED ACCESSORIES				

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<b>Brought Forward</b>				KES		
8	From Generator (E09) to Generator Split Panel(E13)	m	130			
9	From Generator Split Panel 01 (E12) to Generator Sync Panel 01 (E14)	m	12			
10	From Generator Split Panel 01 (E12) to Generator Sync Panel 02 (E15)	m	30			
11	From Generator Split Panel 02 (E13) to Generator Sync Panel 01 (E14)	m	30			
12	From Generator Split Panel 02 (E13) to Generator Sync Panel 02 (E15)	m	12			
13	From Generator Sync Panel 01 (E14) to Main Data Centre LV Board 01 (E17)	m	36			
14	From Generator Sync Panel 02 (E15) to Main Data Centre LV Board 02 (E18)	m	30			
15	From AVR BY-Pass Board 01 (E06)to AVR Equipment (E07)	m	10			
16	From AVR BY-Pass Board 02 (E11)to AVR Equipment (E10)	m	10			
17	From AVR BY-Pass Board 01 (E06) to Main Data Center LV Board 01 (E17)	m	40			
18	From AVR BY-Pass Board 02 (E11) to Main Data Center LV Board 02 (E18)	m	40			
<b>Carried Forward</b>				KES		
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<b>Brought Forward</b>				KES		
	<u>4 core 70sq.mm XLPE/SWA/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>					
19	From Main Data Center LV Board 01 (E17) to 100kVA UPS (E29)	m	15			
20	From Main Data Center LV Board 01 (E17) to Aircon Board 01 (E19)	m	15			
21	From Main Data Center LV Board 02 (E18) to Aircon Board 02 (E25)	m	17			
22	From 100kVA UPS (E29) to Aircon Board 01 (E19)	m	10			
	<u>4 core 120sq.mm XLPE/SWA/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>					
23	From Main Data Center LV Board 01 (E17) to UPS Input/Output Board 01 (E20)	m	10			
24	From Main Data Center LV Board 02 (E18) to UPS Input/Output Board 02 (E24)	m	10			
	<u>4 core 16sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>					
25	From Main Data Center LV Board 01 (E17) to Generator ATS 01 (E37)	m	150			
26	From Main Data Center LV Board 01 (E17) to Generator ATS 02 (E38)	m	150			
<b>Carried Forward</b>				KES		
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<b>Brought Forward</b>				KES		
27	From Main Data Center LV Board 02 (E18) to Generator ATS 01 (E37)	m	150			
28	From Main Data Center LV Board 02 (E18) to Generator ATS 02 (E38)	m	150			
	<u>4 core 25sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>					
29	From Main Data Center LV Board 01 (E17) to Office Supply Board (E22)	m	35			
30	From Main Data Center LV Board 02 (E18) to Office Supply Board (E22)	m	40			
31	From Office Supply Board (E22) to 30kVA UPS- Static Bypass	m	10			
32	From Office Supply Board (E22) to 30kVA UPS- Rectifier Input	m	10			
33	From Office Supply Board (E22) to 30kVA UPS- Manual Bypass	m	10			
	<u>4 core 95sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>					
34	From UPS Input/Output Board 01 (E20) to 120kW MAIN PDF 01 (E33/A)	m	14			
	<b>Carried Forward</b>			KES		
	Section No. 4 Bill No. 6 CABLES AND ASSOCIATED ACCESSORIES					

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<b>Brought Forward</b>				KES	
35	From UPS Input/Output Board 01 (E20) to 80kW MAIN PDF 01 (E34/A)	m	22		
36	From UPS Input/Output Board 02 (E24) to 120kW MAIN PDF 01 (E33/B)	m	14		
37	From UPS Input/Output Board 02 (E24) to 80kW MAIN PDF 02 (E34/B)	m	22		
38	From UPS Input/Output Board 01 (E20) to UPS inputs 01 (E21)	m	7		
39	From UPS Input/Output Board 01 (E20) to UPS input 02 - Static Bypass (E21)	m	7		
40	From UPS Input/Output Board 01 (E20) to Manual Bypass	m	6		
41	From UPS Input/Output Board 02 (E24) to UPS input 01 (E23)	m	7		
42	From UPS Input/Output Board 02 (E24) to UPS input 02- Static Bypass (E23)	m	7		
43	From UPS Input/Output Board 02 (E24) to Manual Bypass	m	6		
<b>Carried Forward</b>				KES	
Section No. 4 Bill No. 6 CABLES AND ASSOCIATED ACCESSORIES					

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<b>Brought Forward</b>				KES	
	<u>4 core 35sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>				
44	From Aircon Board 01 (E19) to 120kW MAIN PDF 01 (E33/A)	m	10		
45	From Aircon Board 01 (E19) to 80kW MAIN PDF 01 (E34/A)	m	10		
46	From Aircon Board 02 (E25) to 120kW MAIN PDF 01 (E33/B)	m	14		
47	From Aircon Board 02 (E25) to 80kW MAIN PDF 02 (E34/B)	m	16		
	<u>4 core 10sq.mm XLPE/PVC 1000V ac shall be supplied to connect the following Boards</u>				
48	From Aircon Board 01 (E19) to Telecom Room A Aircon Rack	m	40		
49	From Aircon Board 01 (E19) to Telecom Room B Aircon Rack	m	20		
50	From Aircon Board 02 (E25) to Telecom Room A Aircon Rack	m	40		
51	From Aircon Board 02 (E25) to Telecom Room B Aircon Rack	m	20		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
	<u>4 core 6sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>				
52	From 120kW MAIN PDF 01 (E33/A) to 4No. CRAC Units	m	40		
53	From 120kW MAIN PDF 02 (E33/B) to 4No. CRAC Units	m	40		
54	From 80kW MAIN PDF 01 (E34/A) to 4No. CRAC Units	m	15		
55	From 80kW MAIN PDF 02 (E34/B) to 2No. CRAC Units	m	15		
	<u>3 core 25sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>				
56	From 30kVA UPS to CU - EV4 (E42) for extra low voltage systems on ground floor.	m	200		
57	From 30kVA UPS to CU - L3 (E43) for lighting on ground floor.	m	200		
	<u>3 core 16sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>				
58	From 30kVA UPS to CU - EV3 (E40) for extra low voltage systems on third floor	m	50		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES		
59	From 30kVA UPS to CU - L2 (E41) for lighting on third floor.  <u>3 core 6sq.mm XLPE/PVC 1000V ac conforming to BS 8436 shall be supplied to connect the following Boards</u>	m	50			
60	From 120kW MAIN PDF 01 (E33/A) to 20No. Server Racks	m	400			
61	From 120kW MAIN PDF 02 (E33/B) to 20No. Server Racks	m	400			
62	From 80kW MAIN PDF 01 (E34/A) to 10No. Server Racks	m	200			
63	From 80kW MAIN PDF 02 (E34/B) to 10No. Server Racks	m	200			
64	From 30kVA UPS to CU - EV1 (E30) for extra low voltage systems on fourth floor	m	40			
65	From 30kVA UPS to CU - EV2 (E32) for extra low voltage systems on fourth floor	m	15			
66	From 30kVA UPS to CU - L1 (E39) for lighting and small power on fourth floor.	m	15			
67	Rack mount STS with rated power 8kw as APC 230V, 1-PH 32A/63A P7724 dual power input or any other approved equal.	No	6			
<b>Carried Forward to Summary of Section No. 4</b>				KES		
Section No. 4 Bill No. 6 CABLES AND ASSOCIATED ACCESSORIES						



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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:7</u></b>				
	<b><u>Ground Floor</u></b>				
1	1 way switching lighting points wired in 3x1.5mm sq PVC insulated single core copper cables drawn in 25mm Ø. HG PVC conduits concealed in building fabrics from distribution board to light fitting to the switch.  <u>Supply, install, test, commission and set to work the following. All lighting fittings to be complete with lamp, control gear etc as applicable.</u>	No	4		
2	2 way switching lighting points wired in 3x1.5mm sq PVC insulated single core copper cables drawn in 25mm Ø. HG PVC conduits concealed in building fabrics from distribution board to light fitting to the switch.  <u>10 A white moulded switch plates as MK or Crabtree: -</u>	No	17		
3	10A 1 Gang 1 Way moulded case plate switch as MK to approval.	No	2		
4	10A 1 Gang 2 Way moulded case plate switch as MK to approval.  <u>Light fixtures</u>	No	4		
5	Track mounted 2x36W vapor proof LED light fixture as GVP-48-2L-LED as Larson electronics	No	21		
6	Ultra slim white aluminium bodied Double sided exit sign with 8W fluorescent tube for non-maintained emergency lighting for 3hours duration as <b>Thorn Voyager LED Exit Sign</b>	No	8		
	<b><u>Third Floor</u></b>				
	<b>Carried Forward</b>			KES	
	Section No. 4 Bill No. 7 SMALL POWER AND LIGHTING				

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<b>Brought Forward</b>				KES	
	<u>Supply, install, test, commission and set to work the following. All lighting fittings to be complete with lamp, control gear etc as applicable.</u>				
7	1 way switching lighting points wired in 3x1.5mm sq PVC insulated single core copper cables drawn in 20mm Ø. HG PVC conduits concealed in building fabrics from distribution board to light fitting to the switch.	No	1		
	<u>10 A white moulded switch plates as MK or Crabtree: -</u>				
8	10A 1 Gang 1 Way moulded case plate switch as MK to approval.	No	1		
	<u>Light fixtures</u>				
9	Track mounted 2x36W vapor proof LED light fixture as GVP-48-2L-LED as Larson electronics	No	30		
	<u>POWER SOCKET OUTLETS</u>				
10	Ring mains socket outlets in 2.5mm <sup>2</sup> PVC - Insulated twin + earth CU cables drawn in concealed 20mm Ø HG PVC conduits concealed in building trunking	No	4		
11	13ATwin power socket outlets with dual earth entry complete with faceplate switched as MK	No	4		
	<b><u>Fourth Floor</u></b>				
	<u>Supply, install, test, commission and set to work the following. All lighting fittings to be complete with lamp, control gear etc as applicable.</u>				
12	1 way switching lighting points wired in 3x1.5mm sq PVC insulated single core copper cables drawn in 25mm Ø. HG PVC conduits concealed in building fabrics from distribution board to light fitting to the switch.	No	34		
	<b>Carried Forward</b>			KES	
	Section No. 4 Bill No. 7 SMALL POWER AND LIGHTING				

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<b>Brought Forward</b>				KES	
13	2 way switching lighting points wired in 3x1.5mm sq PVC insulated single core copper cables drawn in 25mm Ø. HG PVC conduits concealed in building fabrics from distribution board to light fitting to the switch. .	No	38		
	<u>10 A white moulded switch plates as MK or Crabtree: -</u>				
14	10A 1 Gang 1 Way moulded case plate switch as MK to approval.	No	9		
15	10A 1 Gang 2 Way moulded case plate switch as MK to approval.	No	4		
	<u>Light fixtures</u>				
16	Track mounted 2x36W vapor proof LED light fixture as GVP-48-2L-LED as Larson electronics	No	27		
17	36W, 600X600 High performance LED Panel with the following equal or higher characteristics:- <ul style="list-style-type: none"> <li>• Luminous flux - 2500 lumen</li> <li>• Correlated color temperature - 4000k</li> <li>• Color rendering index &gt;80</li> <li>• Maintenance of color output-25,000 hrs</li> <li>• Driver - inbuilt</li> <li>• Mains Voltage -100-240v, 50Hz</li> <li>• Dimming -No</li> <li>• Material - Housing frame plastic: backcover: steel</li> <li>• Output color-white daylight</li> <li>• Optical cover-Light guide wit diffuser</li> <li>• IP -20</li> <li>• Maitenance -N internal cleaning required</li> <li>• Installation- Recessed, individual lay-in in exposed ceiling</li> <li>• Anchorage-supported with steel wire embedded in sofit.</li> </ul> <p>The LED Light shall be equivalent as smartpanel as Philips catalogue 2014/15 or higher spec. (TYPE F4)</p>	No	45		
	<b>Carried Forward</b>			KES	
	Section No. 4 Bill No. 7 SMALL POWER AND LIGHTING				

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<b>Brought Forward</b>				KES		
18	Ultra slim white aluminium bodied Double sided exit sign with 8W fluorescent tube for non-maintained emergency lighting for 3hours duration as <b>Thorn Voyager LED Exit Sign</b>	No	4			
	<u>POWER SOCKET OUTLETS</u>					
19	Ring mains socket outlets in 2.5mm <sup>2</sup> PVC - Insulated twin + earth CU cables drawn in concealed 20mm Ø HG PVC conduits concealed in building trunking	No	43			
20	13ATwin power socket outlets with dual earth entry complete with faceplate switched as MK	No	43			
	<u>Dimmer Switch</u>					
21	500 Watts Touch screen Dimmer Switch Control.	No	1			
	<u>Occupancy Sensors</u>					
22	10A 230V AC Occupancy sensor for detecting the presence of a person to automatically control lights.	No	5			
<b>Carried Forward to Summary of Section No.</b>						
<b>4</b>				KES		
Section No. 4						
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Bill No	SECTION SUMMARY - GENERAL ELECTRICAL AND ASSOCIATED WORKS	Page No	Amount
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2	KPLC NEW SUPPLY CONNECTION	39	
3	CONTAINMENT SYSTEM	47	
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5	POWER BOARDS AND ASOCAITED CABLING	71	
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7	SMALL POWER AND LIGHTING	83	
	<b>Carried to Final Summary</b>		KES
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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:5</u></b>				
	<b><u>BILL NO:1</u></b>				
	<b><u>Supply and Install the following custom made Thermal containment system</u></b>				
	<b><u>Standard Racks POD</u></b>				
	<b><u>Server Cabinets</u></b>				
1	600 mm(W) X1200 mm (D) X 2000 mm (H ), 42 U Rack complete with front and back doors	No	22		
2	ElectroMagnetic Locks for above cabinets	No	42		
3	Side Panels for above cabinets	No	88		
4	Adjustable cable tray, 1 U, 100 kg capacity	No	42		
5	Blanking panel, 1 U	No	420		
6	Cable Tray, 1 U, routing from front to rear of the cabinet with brush	No	42		
7	Horizontal ground bar for customer equipment including cable	No	21		
8	Rack power distribution unit, basic, full height vertical 32 single phase	No	42		
9	32A Industrial three pin socket, single phase plug and receptacle	No	42		
	<b><u>Network Cabinets</u></b>				
10	600 mm(W) X1200 mm (D) X 2000 mm (H ), 42 U Rack complete with front and back doors	No	2		
11	ElectroMagnetic Locks for above cabinets	No	4		
12	Side Panels for above cabinets	No	8		
	<b>Carried Forward</b>			KES	
	Section No. 5 Bill No. 1 STANDARD THERMAL CONTAINMENT POD				

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<b>Brought Forward</b>				KES	
13	Blanking panel, 1 U	No	40		
14	Cable ring	No	36		
15	Horizontal ground bar for customer equipment including cable	No	2		
16	Rack power distribution unit, basic, full height vertical 32 single phase	No	4		
17	32A Industrial three pin socket, single phase plug and receptacle	No	4		
18	Blank Label 1 U	No	2		
<b>Carried Forward</b>				KES	
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	<b>Brought Forward</b>			KES	
19	<p><b><u>Doors</u></b></p> <p>Electric Sliding Double Door for Cold aisle containment</p> <p><b>Opening</b></p> <p>width - 1200mm (+/- 50mm) Height - 2000 mm</p> <p><b>Material</b></p> <p>Door - Sheet steel Window - single safety glass panel Brush Strips - Polyamide (UL9HF-1)</p> <p><b>Finish</b></p> <p>Powder coated texture RAL 7035, light gray</p> <p><b>Supply schedule</b></p> <p>1 FRAME Structure 2 doors 2 floor guides covers sealing materials mounting materials 2 sets of gas pressure springs complete with accessories to be mounted on the door</p>	No	1		
	<b>Carried Forward</b>			KES	
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<b>Brought Forward</b>				KES	
26	Cable tray for cable routing floor or ceiling mounted	m	14		
<b><u>Accesories</u></b>					
27	Decorative Lighting fixture 220-240 V , 50Hz LED - Blue	No	3		
28	Decorative Lighting fixture 220-240 V , 50Hz LED - Red	No	3		
29	Enclosure plate at the top of cabinet to seat the cable trough	No	21		
30	Sealing material for 2000 mm high cabinets (front and rear)	No	21		
<b><u>Air-conditioning Instalaltions</u></b>					
Supply, install, test and commission the following Precision Air-conditioning indoor system as described below.					
<b>Tenders to note also that the technical data indicates are minimum requirements.</b>					
The Equipment should also have the CE Mark					
<b>Carried Forward</b>				KES	
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Brought Forward				KES	
31	<p><b><u>Technical Data (Indoor and Outdoor Unit)</u></b></p> <p><b>Indoor Unit -In Row (Maximum cabinet frame width to be Not more than 600mm)</b></p> <p>Return Air Temperature - 40 Degrees                      Net Sensible Capacity:- 34 kw  <b>10% Altitude correction - 3.4kw</b>                      Air Path - Rear Side In, Front Out                      G4 air filter on the return side                      Humidification capacity 3 kg/hr                      Electric heating capacity 6Kw                      EC Fans                      Humidity Sensor                      Condensate Pump                      Water Leak Detection                      Refrigerant type R410 A                      Hot swappable Fans                      Compressor configuration : Manufacturer latest technology                      Interface cards                      Power supply 3 phase, 400 v, N,PE, 50 Hz - <b>Dual Supply</b>                      Phase failure monitoring and Protection</p> <p><b>Outdoor Unit</b></p> <p>Heat of Rejection more than 40 KW                      Ambient temperature 35 degrees celsius                      Refrigerant type R410 A                      Sound Power level not more than 75 dB (A)                      Sound pressure level free field not more than 65 dB (A)                      Sound pressure level distance 5M                      EC fan type                      Power supply 3 phase, 400 v, N,PE, 50 Hz</p> <p><b><u>Others</u></b></p>	No	4		
32	<p>Allow for complete electrical wiring from an isolator provided on the outdoor power connections (20 metres away) in manufacturers recommended cable.</p>	No	4		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
33	Allow for refrigerant pipes for the units c/w accessories & lagging of the same in manufacturer recommended sizes and materials	m	200		
34	Allow for condensate drainage works	m	30		
35	Allow for bracketing for the outdoor unit	No	4		
36	Allow for pressurizing, vacuum and charging of the system.	No	4		
37	Allow for testing and commissioning of the system.	No	4		
<b><u>Modular UPS for White Space HVAC System</u></b>					
38	Supply, Installation, Testing and Commissioning of a three phase in - three phase out <b>120 KVA</b> Un-interruptible Power Supply Unit (UPS) Modular Type <b>(No. of Modules for to be determined by Manufacturer)</b>				
<b>Guide Technical Specifications are found elsewhere in this document</b>					
<b>TECHNICAL PARAMETERS</b>					
<b>INPUT</b>					
<b>Rated Voltage</b> - 400V 3ph + N					
<b>Voltage Tolerance</b> - 240 V to 480 V					
<b>Rated Frequency</b> - 50/60Hz +/- 10%					
<b>THDI</b> - less than 3% for 100% Linear Load					
<b>Input Power Factor</b> - 0.99					
<b>OUTPUT</b>					
<b>Rated Output</b> - 1ph + N 230V (can be configured 220/240V), 3ph + N 400V (can be configured 380/415V)					
<b>Voltage Tolerance</b> - Static load +/- 1%, dynamic load in accordance with VFI-SS-111					
<b>Frequency Tolerance</b> - 50/60Hz					
<b>Total Output voltage Distortion (Linear Load)</b> - less than 1%					
<b>Carried Forward</b>				KES	
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	<b>Brought Forward</b>			KES	
	<p><b>Total Output voltage Distortion (Linear Load)</b> - less than 3%</p> <p><b>Overload</b> - 125% for 10 mins, 150% for 1min</p> <p><b>Crest Factor</b>- 3:1</p> <p><b>BYPASS</b></p> <p><b>Rated Voltage</b> - rated output voltage</p> <p><b>Voltage tolerance</b> +/- 15% (configurable from 10-20%)</p> <p><b>Rated Frequency</b> - 50/60Hz</p> <p>Frequency Tolerance +/- 2%</p> <p><b>EFFICIENCY</b></p> <p><b>Online Mode @50% Load</b> - Up to 96%</p> <p><b>Online Mode @75% Load</b> - Up to 95%</p> <p><b>Online Mode @100% Load</b> - Up to 94%</p> <p><b>Eco Mode</b> - Up to 98%</p> <p><b>ENVIRONMENT</b></p> <p><b>Operating Ambient Temperature</b> - 0-40 degree celsius</p> <p><b>Relative Humidity</b> - 0-95% without condensation</p> <p><b>Maximum Altitude</b> - 2000 Metres</p> <p><b>Acoustic Noise at 1Metre (ISO 3746)</b> - Less than 65 db</p> <p><b>Degree of Protection</b> - IP20</p> <p><b>STANDARDS</b></p> <p><b>Safety</b> - IEC/EN 62040-1 ,EN60950-1</p> <p><b>EMC</b>- IEC/EN 62040-2</p> <p><b>Perfomance</b> - IEC/EN 62-40-3</p> <p><b>Product Declaration</b> - CE,RCM</p> <p><b>Manual Bypass</b></p> <p><b>BATTERY SYSTEM</b></p> <p><b>Runtime</b> - 10mins @ 90 KW</p> <p><b>Housing</b> - Independent cabinet from UPS</p> <p><b>Battery Cell Material</b> - LiFePO4</p> <p><b>Cycle Life</b> - 5000 cycles @ 50%DOD</p> <p><b>Self Discharge</b> - Less than 5% (0-30 degree celsius /3</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 5</p> <p>Bill No. 1</p> <p>STANDARD THERMAL CONTAINMENT POD</p>				

	<p><b>Brought Forward</b></p> <p>Months)  <b>Fire Protection</b> - Cabinet Level  <b>Communication Interface</b> - Dry Contacts , RS 485  <b>Protection</b> - Over temperature, Over Current, Short Circuit, Over Charge/Discharge  <b>Design Life</b> - 15 Years  <b>Certification</b> - UL 1642, UN 38.3, IEC 62619, IEC 62040, RoHS  <b>IP Protection</b> - IP20</p> <p><b>EMC</b></p> <p><b>Surge</b> - IEC 61000 4-5  <b>ESD</b> - IEC 61000 4-2  <b>Radiated Electric Field</b> - IEC 61000 4-3  <b>Emission</b> - IEC 62040 - 3</p> <p><b>ENVIRONMENT</b>  <b>Operating Temperature</b> - 0-40 Degrees</p> <p><b>Monitoring</b>  <b>Battery Level</b>  <b>System Level</b>  <b>Alarm Monitoring</b></p> <p><b>Cables</b></p> <p>Allow for associated cabling between UPS and Battery Rack, Internally in the battery rack inclusive of isolating breakers</p> <p><b>Allow for Full Load Test including Battery Backup time for the Equipment using mobile load banks</b></p>			KES	
	<p><b>Carried Forward</b></p>			KES	
	<p>Section No. 5                  Bill No. 1                  STANDARD THERMAL CONTAINMENT POD</p>				

	<b>Brought Forward</b>			KES	
39	<p><b><u>Modular UPS for White Space IT System</u></b></p> <p>Supply, Installation, Testing and Commissioning of a three phase in - three phase out <b>150 KVA</b> Un-interruptible Power Supply Unit (UPS) Modular Type <b>(No. of Modules for to be determined by Manufacturer)</b></p> <p><b>Guide Technical Specifications are found elsewhere in this document</b></p> <p><b>TECHNICAL PARAMETERS</b></p> <p><b>INPUT</b></p> <p style="padding-left: 20px;"><b>Rated Voltage</b> - 400V 3ph + N  <b>Voltage Tolerance</b> - 240 V to 480 V  <b>Rated Frequency</b> - 50/60Hz +/- 10%  <b>THDI</b> - less than 3% for 100% Linear Load  <b>Input Power Factor</b> - 0.99</p> <p><b>OUTPUT</b></p> <p style="padding-left: 20px;"><b>Rated Output</b> - 1ph + N 230V (can be configured 220/240V), 3ph + N 400V (can be configured 380/415V)  <b>Voltage Tolerance</b>- Static load +/- 1%, dynamic load in accordance with VFI-SS-111  <b>Frequency Tolerance</b> - 50/60Hz  <b>Total Output voltage Distortion (Linear Load)</b> - less than 1%  <b>Total Output voltage Distortion (Linear Load)</b> - less than 3%  <b>Overload</b> - 125% for 10 mins, 150% for 1min  <b>Crest Factor</b>- 3:1</p>	No	1		
	<b>Carried Forward</b>			KES	
	<p>Section No. 5                  Bill No. 1                  STANDARD THERMAL CONTAINMENT POD</p>				

	<b>Brought Forward</b>			KES	
	<p><b>BYPASS</b></p> <p><b>Rated Voltage</b> - rated output voltage  <b>Voltage tolerance</b> +/- 15% (configurable from 10-20%)  <b>Rated Frequency</b> - 50/60Hz                  Frequency Tolerance +/- 2%</p> <p><b>EFFICIENCY</b></p> <p><b>Online Mode @50% Load</b> - Up to 96%  <b>Online Mode @75% Load</b> - Up to 95%  <b>Online Mode @100% Load</b> - Up to 94%  <b>Eco Mode</b> - Up to 98%</p> <p><b>ENVIRONMENT</b></p> <p><b>Operating Ambient Temperature</b> - 0-40 degree celsius  <b>Relative Humidity</b> - 0-95% without condensation  <b>Maximum Altitude</b> - 2000 Metres  <b>Acoustic Noise at 1Metre (ISO 3746)</b> - Less than 66 db  <b>Degree of Protection</b> - IP20</p> <p><b>STANDARDS</b></p> <p><b>Safety</b> - IEC/EN 62040-1 ,EN60950-1  <b>EMC</b>- IEC/EN 62040-2  <b>Perfomance</b> - IEC/EN 62-40-3  <b>Product Declaration</b> - CE,RCM</p> <p><b>Manual Bypass</b></p> <p><b>BATTERY SYSTEM</b></p> <p><b>Runtime</b> - 15mins @ 120 KW  <b>Housing</b> - Independent cabinet from UPS  <b>Battery Cell Material</b> - LiFePO4  <b>Cycle Life</b> - 5000 cycles @ 50%DOD  <b>Self Discharge</b> - Less than 5% (0-30 degree celsius /3 Months)  <b>Fire Protection</b> - Cabinet Level  <b>Communication Interface</b> - Dry Contacts , RS 485  <b>Protection</b> - Over temperature, Over Current,Short</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 5                  Bill No. 1                  STANDARD THERMAL CONTAINMENT POD</p>				



<p style="text-align: right;"><b>Brought Forward</b></p> <p>Circuit, Over Charge/Discharge  <b>Design Life</b> - 15 Years  <b>Certification</b> - UL 1642,UN 38.2,IEC 62619,IEC 62040,RoHS  <b>IP Protection</b> - IP20</p> <p><b>EMC</b></p> <p><b>Surge</b> - IEC 61000 4-5  <b>ESD</b> - IEC 61000 4-2  <b>Radiated Electric Field</b> - IEC 61000 4-3  <b>Emission</b> - IEC 62040 - 3</p> <p><b>ENVIRONMENT</b>  <b>Operating Temperature</b> - 0-40 Degrees</p> <p><b>Monitoring</b>  <b>Battery Level</b>  <b>System Level</b>  <b>Alarm Monitoring</b></p> <p><b>Cables</b></p> <p>Allow for associated cabling between UPS and Battery Rack, Internally in the battery rack inclusive of isolating breakers</p> <p><b>Allow for Full Load Test including Battery Backup time for the Equipment using mobile load banks</b></p>				KES	
<b>Carried Forward</b>	No	2		KES	
<p>Section No. 5  Bill No. 1  STANDARD THERMAL CONTAINMENT POD</p>					

	Brought Forward			KES	
40	<p><b><u>Compact Power Distribution System</u></b></p> <p><b><u>Integrated UPS Input /Output Panel</u></b></p> <p><i>Bidders to note that local fabrication of this panel will not be allowed. It shall be supplied together with the UPS and should not be more than 900mm x 900mm x 2000mm is size (LXWXH)</i></p> <p>Basic Parameters</p> <p><b>Input Rating</b> : 380/400/415 V, 50/60 Hz, 630 A complete with Maintenance Bypass</p> <p><b>Size</b> : Not more than 900 x 900 x 2000 mm(LXWXH)</p> <p><b>Output</b> : 2No. 250A/3P Circuit breakers</p> <p><b>Monitoring</b>: Modbus and third party systems for three phase voltage, current, load rate, frequency, power factor, active power, appearance power, inactive power, neutral current, voltage distortion rate, current distortion, total power consumption</p> <p><b>Graphical Display</b> : LCD screen graphically displays electrical parameters for inputs</p> <p><b><u>Monitoring</u></b></p>	No	2		
	Carried Forward			KES	
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<b>Brought Forward</b>				KES	
<b><u>Data Collection</u></b>					
41	Main control module for monitoring equipment and environment in the containment:  Basic features: <ul style="list-style-type: none"> <li>• Dual power supply</li> <li>• Status indicator</li> <li>• 3G/4G Antenna port</li> <li>• FE ports</li> <li>• AI/DI input ports</li> <li>• RF_Z Antenna port</li> <li>• RS485 port 12V</li> <li>• DO dry contact ports</li> <li>• USB port</li> <li>• main control module</li> <li>• SIM card slot</li> <li>• Micro-SD card slot</li> </ul>	No	1		
42	Expansion module- 8 RS485/AI/DI multiplex ports	No	23		
<b><u>Network Equipment</u></b>					
43	Smart Ethernet gateway 48VDC-POE	No	13		
44	Network Card,Wifi,1 pORT,USB 2.0	No	1		
45	Power connector, 2Pin, Rail mounted	No	1		
<b><u>Video System</u></b>					
46	2MP Infra Red Fixed Dome Camera	No	2		
<b><u>Access Control System</u></b>					
47	Skylight magnetic lock	No	6		
48	Skyligh actuator POE	No	1		
49	Containment lighting system - Normal			Item	
50	Alternating current actuator for lighting and PAD power supplu	No	2		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES		
51	Entrance Guard Switch	No	2			
52	Biometric access control system for main doors	No	2			
53	Signal controller POE (Temperature,Smoke and Humidity)	No	3			
54	Water Leak detection cable 12VDC-NO/NC 20Meters	No	1			
55	Liquid level sensors	No	4			
56	Temperature and Humidity Sensor	No	20			
57	Buzzer 9-16 VDC	No	1			
58	Temperature sensors with 6 temperature detection points	No	23			
59	Local Manager	No	23			
60	Environmental interface module	No	23			
	<b><u>Monitoring cable (Ethernet Gateway)</u></b>					
61	Signal Cable, standard network cable, 3M, Power supply	No	86			
62	Signal Cable, standard network cable, 5M, Power supply	No	43			
63	Signal Cable, standard network cable, 20M, Power supply	No	1			
64	Signal Cable, shielded through cable	No	22			
	<b>Carried Forward to Summary of Section No. 5</b>					
	Section No. 5			KES		
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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:2</u></b>				
	<b><u>Custom Racks POD</u></b>				
	<b><u>Server Cabinets</u></b>				
1	600 mm(W) X1200 mm (D) X 2000 mm (H ), 42 U Rack complete with front and back doors	No	3		
2	ElectroMagnetic Locks for above cabinets	No	6		
3	Side Panels for above cabinets	No	12		
4	Adjustable cable tray, 1 U, 100 kg capacity	No	6		
5	Blanking panel, 1 U	No	50		
6	Cable Tray, 1 U, routing from front to rear of the cabinet with brush	No	6		
7	Horizontal ground bar for customer equipment including cable	No	3		
8	Rack power distribution unit, basic, full height vertical 32 single phase	No	6		
9	32A Industrial three pin socket, single phase plug and receptacle	No	6		
	<b><u>Accesories</u></b>				
10	Enclosure plate at the top of cabinet to seat the cable trough	No	10		
11	Sealing material for 2000 mm high cabinets (front and rear)	No	6		
	<b>Carried Forward</b>			KES	
	Section No. 5 Bill No. 2 NON STANDARD THERMAL CONTAINMENT POD				

	<p><b>Brought Forward</b></p> <p><b><u>Air-conditioning Instalaltions</u></b></p> <p>Supply, install, test and commission the following Precision Air-conditioning indoor system as described below.</p> <p><b>Tenders to note also that the technical data indicates are minimum requirements.</b></p> <p><b>The Equipment should have the CE Mark</b></p>				KES	
	<p><b>Carried Forward</b></p>				KES	
	<p>Section No. 5                  Bill No. 2                  NON STANDARD THERMAL CONTAINMENT POD</p>					

Brought Forward				KES	
	<p><b><u>Technical Data (Indoor and Outdoor Unit)</u></b></p> <p><b>12 Indoor Unit -In Row (Maximum cabinet frame width to be Not more than 600mm)</b></p> <p>Return Air Temperature - 40 Degrees                      Net Sensible Capacity:- 34 kw  <b>10% Altitude correction - 3.4kw</b>                      Air Path - Side Discharge                      G4 air filter on the return side                      Humidification capacity 3 kg/hr                      Electric heating capacity 6Kw                      EC Fans                      Humidity Sensor                      Condensate Pump                      Water Leak Detection                      Refrigerant type R410 A                      Hot swappable Fans                      Compressor configuration : Manufacturer latest technology                      Interface cards                      Power supply 3 phase, 400 v, N,PE, 50 Hz - <b>Dual Supply</b>                      Phase failure monitoring and Protection</p> <p><b>Outdoor Unit</b></p> <p>Heat of Rejection more than 40 KW                      Ambient temperature 35 degrees celsius                      Refrigerant type R410 A                      Sound Power level not more than 75 dB (A)                      Sound pressure level free field not more than 65 dB (A)                      Sound pressure level distance 5M                      EC fan type                      Power supply 3 phase, 400 v, N,PE, 50 Hz</p> <p><b><u>Others</u></b></p> <p><b>13</b> Allow for complete electrical wiring from an isolator provided on the outdoor power connections (20 metres away) in manufacturers recommended cable.</p>	No	2		
	<b>Carried Forward</b>			KES	
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<b>Brought Forward</b>				KES	
14	Allow for refrigerant pipes for the units c/w accessories & lagging of the same in manufacturer recommended sizes and materials	m	100		
15	Allow for condensate drainage works	m	20		
16	Allow for bracketing for the outdoor unit	No	2		
17	Allow for pressurizing, vacuum and charging of the system.	No	2		
18	Allow for testing and commissioning of the system.	No	2		
<b>Carried Forward</b>				KES	
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		Brought Forward			KES	
	<b><u>Doors</u></b>					
19	Sliding or revolving Single Door for hot aisle containment- <b>Manual</b>					
	<b>Opening</b>					
	width - 1200mm (+/- 50mm)					
	Height - 2000 mm					
	<b>Material</b>					
	Door - Sheet steel					
	Window - single safety glass panel					
	Brush Strips - Polyamide (UL9HF-1)					
	<b>Finish</b>					
	Powder coated texture RAL 7035, light gray					
	<b>Supply schedule</b>					
	1 FRAME Structure					
	2 doors					
	2 floor guides					
	covers					
	sealing materials					
	mounting materials					
	2 sets of gas pressure springs complete with accessories to be mounted on the door					
		No	1			
	<b><u>Aisle Elements</u></b>					
20	Control Skylight 600mm (W) X 1200 (L)					
		No	2			
21	Full skylight					
		No	14			
	<b>Carried Forward</b>				KES	
	Section No. 5					
	Bill No. 2					
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<b>Brought Forward</b>				KES	
22	roof end strips	No	2		
23	Cable troughs for 600mm wide cabinets	No	16		
24	Sheet mater plate for mounting accesories	No	16		
25	Cable tray for cable routing floor or ceiling mounted	No	16		
<b><u>Accesories</u></b>					
26	Lighting fixture 220-240 V , 50Hz LED	No	10		
27	Enclosure plate at the top of cabinet to seat the cable trough	No	16		
28	Sealing material for 2000 mm high cabinets (front and rear)	No	16		
<b><u>Monitoring</u></b>					
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES	
<b><u>Data Collection</u></b>					
29	Main control module for monitoring equipment and environment in the containment:  Basic features: <ul style="list-style-type: none"> <li>• Dual power supply</li> <li>• Status indicator</li> <li>• 3G/4G Antenna port</li> <li>• FE ports</li> <li>• AI/DI input ports</li> <li>• RF_Z Antenna port</li> <li>• RS485 port 12V</li> <li>• DO dry contact ports</li> <li>• USB port</li> <li>• main control module</li> <li>• SIM card slot</li> <li>• Micro-SD card slot</li> </ul>	No	1		
30	Expansion module- 8 RS485/AI/DI multiplex ports	No	6		
<b><u>Network Equipment</u></b>					
31	Smart Ethernet gateway 48VDC-POE	No	1		
32	Network Card,Wifi,1 pORT,USB 2.0	No	1		
33	Power connector, 2Pin, Rail mounted	No	1		
<b><u>Video System</u></b>					
34	2MP Infra Red Fixed Dome Camera	No	2		
<b><u>Access Control System</u></b>					
35	Skylight magnetic lock	No	4		
36	Skyligh actuator POE	No	1		
37	Containment lighting system - Normal		Item		
38	Alternating current actuator for lighting and PAD power supplu	No	2		
<b>Carried Forward</b>				KES	
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<b>Brought Forward</b>				KES		
39	Entrance Guard Switch	No	1			
40	Biometric access control system for main doors	No	1			
41	Signal controller POE (Temperature,Smoke and Humidity)	No	3			
42	Water Leak detection cable 12VDC-NO/NC 50Meters	No	1			
43	Liquid level sensors	No	2			
44	Temperature and Humidity Sensor	No	8			
45	Temperature sensors with 6 temperature detection points	No	11			
46	Local Manager	No	11			
47	Environmental interface module	No	11			
<b><u>Monitoring cable (Ethernet Gateway)</u></b>						
48	Signal Cable, standard network cable, 3M, Power supply	No	20			
49	Signal Cable, standard network cable, 5M, Power supply	No	30			
50	Signal Cable, standard network cable, 20M, Power supply	No	5			
51	Signal Cable, shielded through cable	No	4			
<b>Carried Forward to Summary of Section No. 5</b>						
Section No. 5					KES	
Bill No. 2						
NON STANDARD THERMAL CONTAINMENT POD						

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Item No		Unit	Quantity	Rate	Amount
	<p><b><u>BILL NO:3</u></b></p> <p><i>Critical Component's for Integrated Server Racks system (Rack, rPDU's, Cooling, UPS and monitoring system) should be from single OEM for Seamless Integration, pre- installed in one single part number and serial number</i></p> <p><i>Detailed Specifications are contained in the Technical Specifications section</i></p> <p><b><u>Telco A, B and Server Rooms</u></b></p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 5                      Bill No. 3                      SMART INTERGRATED RACK</p>				

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	<b>Brought Forward</b>			KES	
	<b>Carried Forward</b>			KES	
	Section No. 5 Bill No. 3 SMART INTERGRATED RACK				

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1	<p style="text-align: right;"><b>Brought Forward</b></p> <p>Integrated Single-Rack System complete with power distribution panel, UPS and battery, IT cooling, rack PDU , power management unit, LCD touch screen panel and environmental sensors in a fully enclosed rack with factory pre-assembled,</p> <p><b>General:</b></p> <ul style="list-style-type: none"> <li>• 42U racks of dimensions 600mm X 1100mm X 2000mm (WXDXH)</li> <li>• Environmental Remote Monitoring capable for Water leak detection, Temperature sensor &amp; Door Sensors.</li> <li>• Electrical system with inbuilt essential MCB mounted inside the cabinet &amp; Lighting protection device</li> <li>• Inbuilt Emergency ventilation system shall activate in the event of overheating</li> <li>• min 22 U usable space distributed in 1 rack, to accommodate IT and network equipment &amp; devices</li> <li>• net sensible cooling capacity rated no less than <u>3.5</u> kW and <u>5</u> KVA rack mountable UPS with 10 mins of internal Battery Backup at 3KW load.</li> <li>• Human Machine Interface Display</li> <li>• 2 x Basic PDU 8 x C13,32A</li> </ul> <p><b>Standards:</b></p> <p>General safety requirements for Integrated rack :</p> <p>EN 609501:2006+A11:2009+A1:2010+A12:2011</p> <p>EMC requirements for Integrated rack:</p>			KES	
	<b>Carried Forward</b>			KES	
	<p>Section No. 5  Bill No. 3  SMART INTERGRATED RACK</p>				

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	<p style="text-align: right;"><b>Brought Forward</b></p> <p>EN 55022:2010 EN 61000-3-11:2000</p>				KES
		No	4		
	<p><b>Carried Forward to Summary of Section No. 5</b></p> <p>Section No. 5          Bill No. 3          SMART INTERGRATED RACK</p>				KES



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Item No		Unit	Quantity	Rate	Amount
	<p><b><u>BILL NO:4</u></b></p> <p>Supply, configure test and commission Data Center Infrastructure Management system with the following features as a minimum;</p> <p>Digital Visualization;</p> <ol style="list-style-type: none"> <li>1. 3 D</li> <li>2. Temperature Neophram</li> <li>3. System/Device Integration for north and southbound interfaces</li> <li>4. Device Monitoring</li> <li>5. Big Screen display</li> <li>6. Alarm Management</li> <li>7. Power Link Visualization</li> <li>8. Cooling Link Visualization</li> <li>9. Report Management</li> <li>10. Work Order Management</li> <li>11. Capacity Management</li> <li>12. Asset Management</li> </ol> <p><b><u>Hardware</u></b></p> <p><b><u>Software</u></b></p> <p>1 Software cost to perform the basic functions indicated for 150 smart devices</p> <p><b><u>Server Equipment and Data Collection</u></b></p> <p>2 Management system server, Basic english edition with operating system and Data Base dual powered</p> <p>3 Rectifier module, I U, 1000 W</p> <p><b><u>Network Equipment</u></b></p> <p>4 Modem, wireless, 4G/3G/GPRS, External, USB power</p>				
	<b>Carried Forward</b>			KES	
	<p>Section No. 5            Bill No. 4            DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTE</p>				

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5	<p style="text-align: right;"><b>Brought Forward</b></p> <p>Network switch 24 X 10/10/1000 BASE-T ports,4x10GESFP + Ports, POE, Dual powered</p>	No	1	KES	
	<p><b>Carried Forward to Summary of Section No. 5</b></p> <p>Section No. 5                  Bill No. 4                  DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTE</p>			KES	

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Item No		Unit	Quantity	Rate	Amount
1	<p><b><u>BILL NO. 5</u></b></p> <p><b><u>Field Controller</u></b></p> <p>BACtalk field controller with 16 inputs</p> <p><b>Power :</b> 24 VAC @ 10 VA max.</p> <p><b>Inputs :</b> 16 inputs with 10-bit resolution. Input 0 can be used for a BACtalk Microset. Inputs 1–15 are jumper-configurable for thermistor/dry contact, 0–5 VDC/4–20 mA signals or 0–10 VDC signals. Inputs 1–3 accept pulse inputs.</p> <p><b>24VDC Output :</b> 3 terminals provide up to 100 mA (total) of 24 VDC to power transducers or other devices.</p> <p><b>Processor &amp; Memory:</b> processor with on-board flash memory. Flash memory provides nonvolatile program and data storage, and allows for encrypted updates to the program for future product enhancements.</p> <p><b>Terminations:</b> Removable header-type screw terminals accept 14–24 AWG wire</p> <p><b>Environmental:</b> 0–158 deg. F (-17–70 deg. C). 0–95% RH, non-condensing.</p> <p><b>Communications:</b> BACnet MS/TP LAN up to 76.8 Kbps</p> <p><b>BACnet Conformance</b> An application specific controller (ASC) level device; tested and approved by BTL.</p> <p><b>Ratings :</b> Listed Underwriters Laboratory for Open Energy Management Equipment (PAZX) under the UL Standard for Safety 916; listing includes both U.S. and Canadian certification EMC Directive 89/336/EEC (European CE Mark) FCC Part 15, Subpart J, Class A</p>	No	8		
	<b>Carried Forward</b>			KES	
	<p>Section No. 5            Bill No. 5            MONITORING FOR NON WHITE SAPCE EQUIPMENT</p>				

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<b>Brought Forward</b>				KES	
2	Transformer 240V/24V 6A AC	No	6		
3	Transformer 240V/24V 2A AC	No	2		
<b><u>Temperature and Humidity Sensors</u></b>					
4	Combined Temperature and Humidity Sensor  <b>Approvals:</b> IEC 751 Class for PT1000 Sensor <b>IP Rating :</b> IP 30 <b>R H range :</b> 5-95% <b>RH sensing element :</b> Capacitative <b>Power Supply :</b> 24AC <b>Temperature Element :</b> No. <b>Temperature range :</b> No. <b>Output Signal :</b> 0-10 V	No	8		
<b><u>Global Controller</u></b>					
5	<b>POWER :</b> 20-30 VAC @ 40 VA, 47–63 Hz, full-wave rectified.  <b>DATA BACKUP/STORAGE :</b> One removable microSD card.  <b>PROCESSOR AND MEMORY:</b> Efficient, high-speed, quad-core CPU based on the ARM® Cortex™-A9 architecture (Free scale i.MX6Quad); 1GB DDR3 SDRAM, 64-bit-wide, 533 MHz (1066 MT/s).  <b>REAL-TIME CLOCK :</b> Provides system date and time.  <b>BACNET/IP :</b> IP support for interoperability on enterprise and WANs. Functions as up to four BACnet broadcast management devices (BBMDs) in accordance with Annex J BACnet/IP. Supports BACnet Standard network address translation (NAT) implementations. MS/TP Supports two onboard networks that can be used for BACnet MS/TP or EIA-485 and up to two expansion cards (two networks each) for a maximum of six BACnet MS/TP networks per Global Controller. MODBUS supports both TCP and RTU (EIA-485 and EIA-232) protocols; configuration supports up to 384 Modbus devices. TUX Supports up to four trunks for connection of up				
<b>Carried Forward</b>				KES	
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	<p style="text-align: right;"><b>Brought Forward</b></p> <p>to 64 TUXs per trunk communicating at 4800/9600 baud or up to 32 TUXs per trunk communicating at 1200 baud. Each TUX Option Card has two TUX trunks.</p> <p><b>VLX/EXP:</b> Supports up to four instances of the VLX application; one instance is included with the Global Controller</p> <p><b>EXPANSION:</b> Supports up to two expansion cards for interface adapters, such as EIA-485, EIA-232, LON, and TUX.</p> <p><b>COMMUNICATIONS:</b> Provides two Ethernet ports, two onboard EIA-485 networks, two expansion card slots give the ability to add up to four additional EIA-485 networks (for a total of six), or two EIA-232 connections, or two LONworks networks, or up to four TUX Trunks.</p> <p><b>ENVIRONMENTAL Without battery:</b> -4 to 149 °F (-20 to 65 °C), 0 to 95% RH, non-condensing. Storage Temperature: -4 to 185 °F (-20 to 85 °C), 0 to 95% RH, non-condensing.</p> <p><b>PLATFORM ;</b> Linux.</p> <p><b>ETHERNET :</b> Two integrated 8P8C modular connectors for use with two 10Base-T, 100Base-TX, and 1000Base-T Ethernet networks.</p> <p><b>SOFTWARE:</b> Programming interface is operator workstation software. Niagara AX 3.8.</p> <p><b>CERTIFICATIONS AND STANDARDS -</b> RoHS compliant - CE (EN 60730-1) - FCC Part 15 Class B - ICES-003 - C-Tick listed - UL 916 for open energy management equipment.</p> <p>6 Operating software for upto 50 connected devices with SQL support</p> <p>7 Operating Licenses for 25 devices connected directly to the Global Controller</p> <p style="text-align: right;"><b>Carried Forward</b></p> <p>Section No. 5  Bill No. 5  MONITORING FOR NON WHITE SAPCE EQUIPMENT</p>			KES	
		No	1		
		No	1		
			Item		
				KES	

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<b>Brought Forward</b>				KES	
8	Software driver to the Global Controller to communicate with Modbus Devices over RS 232 or RS 485		Item		
<b><u>DCIM Intergration Engine</u></b>					
9	Complete with Niagara analytics framework				
	<b>CERTIFICATIONS</b> : UL 916 , CE EN 61326-1, FCC Part 15 Subpart B, Class B , FCC Part 15 Subpart C , ROHS				
	<b>ENVIRONMENTAL SPECIFICATIONS</b> :Operating temperature: -20-60°C , Storage temperature: -40-85°C , Humidity: 5%-95% — Non condensing	No	1		
10	Support for upto 25 devices or 1250 points with Niagra 4.0 or higher		Item		
11	Support for upto Five Years		Item		
12	Expansion module dual port RS 485	No	2		
<b><u>Client Workstation</u></b>					
13	Server Computer complete with windows 10 and Operating software above	No	1		
<b><u>Enclosures</u></b>					
14	Custom Enclosures Maximum of 3 No. controller in the biggest unit	No	7		
<b><u>Cabling</u></b>					
15	2 Conductor 22 American wire gauge, stranded overall shielded type CM or AWM 2019, ROHS Compliant for BACnet MS/Tp connections. (approximate average distance of 100 meters). This item is provisional and subject to precise measurement and approval prior to installations	m	200		
<b>Carried Forward</b>				KES	
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	<b>Brought Forward</b>			KES	
16	2 Conductor 18 American wire gauge, stranded overall shielded type CMR/CL3R/FPLR Compliant for Digital Input connections. (approximate average distance of 50 meters). This item is provisional and subject to precise measurement and approval prior to installations	No	20		
	<b><u>Testing and Commissioning</u></b>				
17	Professional Charges for installations and configuring the entire system including liason with that part OEM controller vendors		Item		
	<b>Carried Forward to Summary of Section No. 5</b>			KES	
	Section No. 5 Bill No. 5 MONITORING FOR NON WHITE SAPCE EQUIPMENT				

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Item No		Unit	Quantity	Rate	Amount
1	<p><b><u>BILL NO. 6</u></b></p> <p>Factory acceptance tests for Integrated Rack, UPS, White space Air conditioning and Racks, UPS Equipment.. The amount to cover for air travel, hotel full accommodation minimum four star, overseas and local transport, subsistence and miscellaneous expenses for the Client Representatives and M&amp;E Consultants. (10 persons)- In the event the Travel is not permissible due to travel restriction virtual FAT will be considered</p>		Item		
	<p><b>Carried Forward to Summary of Section No. 5</b></p> <p>Section No. 5            Bill No. 6            FACTORY ACCEPTANCE</p>			KES	



Bill No	<u>SECTION SUMMARY - INTERGRATED RACK SYSTEMS</u>	Page No	Amount
1	STANDARD THERMAL CONTAINMENT POD	99	
2	NON STANDARD THERMAL CONTAINMENT POD	107	
3	SMART INTERGRATED RACK	111	
4	DATA CENTER INFRASTRUCTURE MANAGEMENT SYSTEM	113	
5	MONITORING FOR NON WHITE SAPCE EQUIPMENT	118	
6	FACTORY ACCEPTANCE	119	
<b>Carried to Final Summary</b>			KES
Section No. 5			



Brought Forward				KES	
<b><u>VRV INDOOR UNIT</u></b>					
<b><u>Ducted High Pressure Units</u></b>					
2	VRF Ducted Indoor Unit as  Cooling Capacity - <b>12.5 kw</b> Power requirements - <b>1 phase 50 Hz 220-240V</b> Height - <b>275 mm</b> Width - <b>1000 mm</b> Depth - <b>750 mm</b> Standard air flow - <b>1500 m3/h</b> Motor output - <b>200 watts</b> Gas side - <b>φ15.9 mm</b> Liquid Side - <b>φ9.5 mm</b> Drawing Port - <b>φ25 mm</b> Sound Pressure Level (dB(A)) - <b>40</b>	No	2		
<u>Ductwork for above system</u>					
3	Galvanized sheet steel ductwork inclusive of all joints, bends, bracing, gaskets, supports, stiffeners, turning vanes, splitters, vapor seals, access hatches at every 3000mm and change of direction and any other equipment for completion.  Material Thickness 1.0 mm	m2	30		
<b>Carried Forward</b>				KES	
Section No. 6 Bill No. 1 VRF SYSTEM					

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<b>Brought Forward</b>				KES	
	<u>Air Terminal Devices for above system</u>				
4	Supply Ventilation Grilles, made of Aluminium, with individually adjustable, horizontal blades <ul style="list-style-type: none"> <li>• Nominal sizes 300 mm x 200 mm</li> <li>• Volume flow rate range <b>to be confirmed after sizing calculations.</b></li> <li>• Grille face made of aluminium with powder-coat finish</li> <li>• Front border 32 mm</li> <li>• Concealed fixing or countersunk holes</li> <li>• Installation subframe</li> <li>• Attachments for volume flow rate balancing and air direction control</li> <li>• Concealed fixing or countersunk holes</li> <li>• Double-layer Louver</li> </ul>	No	7		
	<b><u>REFRIGERANT PIPES</u></b>				
	Copper Piping - Provisional Lengths subject to re-measurement and in Manufacturers approved quality and Armaflex insulation				
5	9.5 mm Diameter	m	20		
6	12.7 mm Diameter	m	20		
7	15.8 mm Diameter	m	20		
8	19.5 mm Diameter	m	10		
9	22.2 mm Diameter	m	10		
10	Allow for Vaccuming of entire piping system and charge it as per manufacturers Recommendations			Item	
	<b>Carried Forward</b>			KES	
	Section No. 6 Bill No. 1 VRF SYSTEM				



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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:2</u></b>				
	<b><u>FRESH AIR UNITS</u></b>				
1	Air to Air Heat Exchanger Indoor Unit as  Power requirements - <b>1 phase 50 Hz 220-240V</b> Height - <b>900 mm</b> Width - <b>900 mm</b> Depth - <b>290 mm</b> Standard air flow - <b>250 m3/h</b> Temperature Exchange Efficiency - <b>78%</b> Enthalpy Exchange Efficiency - <b>70%</b>  <u>Ductwork for above system</u>	No	2		
2	Galvanized sheet steel ductwork inclusive of all joints, bends, bracing, gaskets, supports, stiffeners, turning vanes, splitters, vapor seals, access hatches at every 3000mm and change of direction and any other equipment for completion.  Material Thickness 1.0 mm  <u>Air Terminal Devices for above system</u>	m2	10		
3	Supply Ventilation Grilles, made of Aluminium, with individually adjustable, horizontal blades <ul style="list-style-type: none"> <li>• Nominal sizes 300 mm x 200 mm</li> <li>• Volume flow rate range <b>to be confirmed after sizing calculations.</b></li> <li>• Grille face made of aluminium with powder-coat finish</li> <li>• Front border 32 mm</li> <li>• Concealed fixing or countersunk holes</li> <li>• Installation subframe</li> <li>• Attachments for volume flow rate balancing and air direction control</li> <li>• Concealed fixing or countersunk holes</li> <li>• Double-layer Louver</li> </ul>	No	4		
	<b>Carried Forward to Summary of Section No. 6</b>				KES
	Section No. 6				
	Bill No. 2				
	FRESH AIR UNITS				

Item No		Unit	Quantity	Rate	Amount
1	<p><b><u>BILL NO:3</u></b></p> <p><b><u>PRECISION SPLIT HIGH WALL MOUNTED AIR-CONDITIONING UNIT</u></b></p> <p><b>Design Conditions:</b></p> <ul style="list-style-type: none"> <li>• Inside Design condition : 27 Deg C <math>\pm</math>2 Deg C and Max 50% RH</li> <li>• Ambient air design temperature: 35 Deg C</li> <li>• Type of load : High sensible heat load (Sensible heat factor above 0.90)</li> </ul> <p><b>Net Sensible Cooling Capacity - 10.5 KW</b></p> <p><b>Cooling Circuit</b></p> <ul style="list-style-type: none"> <li>• R407C/R410A based Scroll compressor, hydrophilic coated evaporator coil, condenser coil, thermostatic expansion valve(<b>Capillary Tube type expansion device is not acceptable</b>) and filter drier</li> </ul> <p><b>Fan Section</b></p> <ul style="list-style-type: none"> <li>• direct drive electronically commutated radical</li> </ul> <p><b>Cabinet and Frame</b></p> <ul style="list-style-type: none"> <li>• The exterior steel panels will be custom powder coated</li> </ul> <p><b>Air Filtration</b></p> <ul style="list-style-type: none"> <li>• HDPE air-filter having filtration efficiency of 90% down to 10 micron</li> </ul> <p><b>Air Cooled Condenser</b></p> <ul style="list-style-type: none"> <li>• The air-cooled condenser coil is constructed of mechanically expanded copper tubes in enhanced surface aluminium fin with Hydrophilic coating.</li> </ul> <p style="text-align: center;"><b>Carried Forward</b></p> <p>Section No. 6                      Bill No. 3                      PRECESION SPLIT UNITS</p>			KES	





Bill No	<u>SECTION SUMMARY - AIR-CONDITIONING FOR OTHER SPACES</u>	Page No		Amount
1	VRF SYSTEM	124		
2	FRESH AIR UNITS	125		
3	PRECESION SPLIT UNITS	127		
<b>Carried to Final Summary</b>				
Section No. 6			KES	

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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:7</u></b>				
	<b><u>BILL NO:1</u></b>				
	Supply, install, test and commission the following IG541 fire suppression system for Data Center comprising of a sub-floor 250mm high				
	<b>(This section should be read with Technical specifications of this document where particular specifications for the system are found)</b>				
1	Container Assembly (UL Listed) - 80 L fully charged with IG541 Agent by Manufacturer. <b>(Duty and Standby Mode)</b>	No	16		
2	Container Label	No	16		
3	Container Bracket (Strap Type)	No	16		
4	Discharge Hose 50mm	No	16		
5	Actuation mechanism per system - UL Listed	No	1		
6	Manifold for the system complete with lockout, time delay, safety and vent devices	No	1		
	<b>Fire Suppression system control equipment, UL Listed and conforming to EN54 and NFPA standards</b>				
7	addressable optical sensor complete with standard base	No	10		
8	Manual Release	No	1		
9	Monitor Module for above	No	1		
10	Sounder-beacon, multi tone, shallow base	No	1		
11	Control Module for above	No	1		
12	Abort Switch	No	1		
	<b>Carried Forward</b>			KES	
	Section No. 7 Bill No. 1 WHITE SPACE				

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<b>Brought Forward</b>				KES	
13	Monitor Module for above	No	1		
14	Maintenance Switch	No	1		
15	Monitor Module for above	No	1		
16	Low smoke, 0 halogen, 1.5mm <sup>2</sup> 2 core fire-proof/ flame proof cables and all necessary cabling for all smoke detectors, fire alarm panel and sounders as delta fire-tuff complete with flame-resistant terminations, and accessories. The cables to be capable of withstanding heavy flames for minimum 3 hours.				
	<b>(The tenderers to include for flame testing of the cables for at least 30 minutes)</b>	m	200		
17	24V 2A Power supply module complete with Battery and Accessories	No	1		
18	Warning Sign Inside	No	1		
19	Warning sign outside	No	1		
20	UL Listed Fire Damper (Size 350mm X 325mm)	No	1		
21	UL Listed Fire Damper (Size 200mm X 150mm)	No	1		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 1 WHITE SPACE					

<b>Brought Forward</b>				KES	
<b><u>Pipework (Provisional Subject to Hydraulic Calculations)</u></b>					
Supply and fix seamless black Steel pipes SCH 40 conforming to ASTM A-53A ERW or ASTM A-106 A. All piping shall comply with NFPA 2001.					
Fittings beyond Orifice union/nipple shall be, 300lb class fittings conforming to ANSI B-16.3. Ordinary cast iron fittings shall not be used. Piping shall be bracketed within 12" (0.3m.) of all discharge nozzles.					
Tenderers must allow in their pipework prices for all the couplings, unions, sockets, nipples, tees, caps, connectors, joints, anchoring, support brackets etc in running lengths of pipes and also where necessary for fixing clips, holderbats, plugged and screwed.					
22	50mm diameter seamless black Steel pipe as SCH 40	m	5		
23	40mm diameter seamless black Steel pipe as SCH 40	m	5		
24	32mm diameter seamless black Steel pipe as SCH 40	m	37		
25	25mm diameter seamless black Steel pipe as SCH 40	m	26		
26	20mm diameter seamless black Steel pipe as SCH 40	m	33		
27	32mm diameter elbow	No	3		
28	25mm diameter elbow	No	5		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 1 WHITE SPACE					

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Brought Forward				KES	
29	20mm diameter elbow	No	5		
30	50mm diameter equal tee	No	4		
31	40mm diameter equal tee	No	2		
32	32mm diameter equal tee	No	5		
33	25mm diameter equal tee	No	4		
34	20mm diameter equal tee	No	5		
	<b><u>360 Degree Nozzle</u></b>				
35	25mm Brass Nozzle	No	4		
36	20mm Brass Nozzle	No	4		
<b>Carried Forward to Summary of Section No.</b>					
<b>7</b>				KES	
Section No. 7					
Bill No. 1					
WHITE SPACE					

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:2</u></b>				
	Supply, install, test and commission the following IG541 fire suppression system for Data Center comprising of a sub-floor 250mm high				
	<b>(This section should be read with Technical specifications of this document where particular specifications for the system are found)</b>				
1	Container Assembly (UL Listed) - 80 L fully charged with IG541 Agent by Manufacturer. <b>(Duty and Standby Mode)</b>	No	12		
2	Container Label	No	12		
3	Container Bracket (Strap Type)	No	12		
4	Discharge Hose 50mm	No	12		
5	Actuation mechanism per system - UL Listed	No	1		
6	6No. Diverter Valves	No	6		
7	Manifold for the system complete with lockout, time delay, safety and vent devices	No	1		
	<b>Fire Suppression system control equipment, UL Listed and conforming to EN54 and NFPA standards</b>				
8	addressable optical sensor complete with standard base	No	13		
9	Manual Release	No	6		
10	Monitor Module for above	No	6		
11	Sounder-beacon, multi tone, shallow base	No	6		
12	Control Module for above	No	6		
13	Abort Switch	No	6		
	<b>Carried Forward</b>			KES	
	Section No. 7 Bill No. 2 TELECOM A,B, POWER A,B AND SERVER ROOMS				

**KENYA REVENUE AUTHORITY**  
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**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES	
14	Monitor Module for above	No	6		
15	Maintenance Switch	No	6		
16	Monitor Module for above	No	6		
17	Low smoke, 0 halogen, 1.5mm <sup>2</sup> 2 core fire-proof/ flame proof cables and all necessary cabling for all smoke detectors, fire alarm panel and sounders as delta fire-tuff complete with flame-resistant terminations, and accessories. The cables to be capable of withstanding heavy flames for minimum 3 hours.				
	<b>(The tenderers to include for flame testing of the cables for at least 30 minutes)</b>	m	1,000		
18	24V 2A Power supply module complete with Battery and Accessories	No	6		
19	UL Listed Fire Damper (Size 200mm X 150mm)	No	3		
20	UL Listed Fire Damper (Size 200mm X 100mm)	No	1		
21	Warning Sign Inside	No	6		
22	Warning sign outside	No	6		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 2 TELECOM A,B, POWER A,B AND SERVER ROOMS					

<b>Brought Forward</b>				KES	
<b><u>Pipework (Provisional Subject to Hydraulic Calculations)</u></b>					
Supply and fix seamless black Steel pipes SCH 40 conforming to ASTM A-53A ERW or ASTM A-106 A. All piping shall comply with NFPA 2001.					
Fittings beyond Orifice union/nipple shall be, 300lb class fittings conforming to ANSI B-16.3. Ordinary cast iron fittings shall not be used. Piping shall be bracketed within 12" (0.3m.) of all discharge nozzles.					
Tenderers must allow in their pipework prices for all the couplings, unions, sockets, nipples, tees, caps, connectors, joints, anchoring, support brackets etc in running lengths of pipes and also where necessary for fixing clips, holderbats, plugged and screwed.					
23	50mm diameter seamless black Steel pipe as SCH 40	m	3		
24	40mm diameter seamless black Steel pipe as SCH 40	m	3		
25	32mm diameter seamless black Steel pipe as SCH 40	m	3		
26	25mm diameter seamless black Steel pipe as SCH 40	m	60		
27	20mm diameter seamless black Steel pipe as SCH 40	m	35		
28	15mm diameter seamless black Steel pipe as SCH 40	m	19		
29	25mm diameter elbow	No	8		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 2 TELECOM A,B, POWER A,B AND SERVER ROOMS					



KENYA REVENUE AUTHORITY  
 PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER  
 TENDER REF NO: KRA/HQS/NCB/045/2020-2021  
 BILLS OF QUANTITIES

Brought Forward				KES	
30	20mm diameter elbow	No	10		
31	15mm diameter elbow	No	8		
32	50mm diameter equal tee	No	3		
33	40mm diameter equal tee	No	3		
34	32mm diameter equal tee	No	5		
35	25mm diameter equal tee	No	16		
36	20mm diameter equal tee	No	2		
	<b><u>360 Degree Nozzle</u></b>				
37	20mm Brass Nozzle	No	3		
38	15mm Brass Nozzle	No	3		
<b>Carried Forward to Summary of Section No.</b>					
<b>7</b>				KES	
Section No. 7					
Bill No. 2					
TELECOM A,B, POWER A,B AND SERVER ROOMS					

KENYA REVENUE AUTHORITY  
 PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER  
 TENDER REF NO: KRA/HQS/NCB/045/2020-2021  
 BILLS OF QUANTITIES

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:3</u></b>				
	<b><u>CO2 Fire Suppression System</u></b>				
	Supply, install, test and commission Carbon dioxide system for Kenya Power Metering rooms with measuring 45m3				
	<b>(This section should be read with Technical specifications of this document where particular specifications for the system are found)</b>				
	<b>Pilot Loop System will not be accepted</b>				
	<b>All components to be UL Listed or FM approved</b>				
1	<b>45kg Co2 Centralised System complete with all accessories fully charged with agent.</b>	No	1		
2	Container Label	No	1		
3	Container Bracket (Strap Type)	No	1		
4	Discharge Hose 50mm	No	1		
5	Actuation mechanism per system - UL Listed	No	1		
6	Manifold for the system complete with lockout, time delay, safety and vent devices	No	1		
	<b>Fire Suppression system control equipment, UL Listed and conforming to EN54 and NFPA standards</b>				
7	addressable optical sensor complete with standard base	No	2		
8	Manual Release	No	1		
9	Monitor Module for above	No	1		
	<b>Carried Forward</b>			KES	
	Section No. 7 Bill No. 3 KENYA POWER ROOM				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES	
10	Sounder-beacon, multi tone, shallow base	No	1		
11	Control Module for above	No	1		
12	Abort Switch	No	1		
13	Monitor Module for above	No	1		
14	Maintenance Switch	No	1		
15	Monitor Module for above	No	1		
16	Low smoke, 0 halogen, 1.5mm <sup>2</sup> 2 core fire-proof/ flame proof cables and all necessary cabling for all smoke detectors, fire alarm panel and sounders as delta fire-tuff complete with flame-resistant terminations, and accessories. The cables to be capable of withstanding heavy flames for minimum 3 hours.				
	<b>(The tenderers to include for flame testing of the cables for at least 30 minutes)</b>	m	200		
17	24V 2A Power supply module complete with Battery and Accessories	No	1		
18	UL Listed Fire Damper (Size 200mm X 150mm)	No	1		
19	UL Listed Fire Damper (Size 275mm X 150mm)	No	1		
20	Warning Sign Inside	No	1		
21	Warning sign outside	No	1		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 3 KENYA POWER ROOM					

	Brought Forward				KES
	<p><b><u>Pipework (Provisional Subject to Hydraulic Calculations)</u></b></p> <p>Supply and fix seamless black Steel pipes SCH 40 conforming to ASTM A-53A ERW or ASTM A-106 A. All piping shall comply with NFPA 2001.</p> <p>Fittings beyond Orifice union/nipple shall be, 300lb class fittings conforming to ANSI B-16.3. Ordinary cast iron fittings shall not be used. Piping shall be bracketed within 12" (0.3m.) of all discharge nozzles.</p> <p>Tenderers must allow in their pipework prices for all the couplings, unions, sockets, nipples, tees, caps, connectors, joints, anchoring, support brackets etc in running lengths of pipes and also where necessary for fixing clips, holderbats, plugged and screwed.</p>				
22	25mm diameter seamless black Steel pipe as SCH 40	m	12		
23	20mm diameter seamless black Steel pipe as SCH 40	m	2		
24	20mm diameter elbow	No	5		
25	25mm diameter equal tee	No	2		
	<p><b><u>360 Degree Nozzle</u></b></p>				
26	20mm Brass Nozzle	No	1		
	<p><b>Carried Forward to Summary of Section No. 7</b></p> <p>Section No. 7                      Bill No. 3                      KENYA POWER ROOM</p>				KES

KENYA REVENUE AUTHORITY  
 PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER  
 TENDER REF NO: KRA/HQS/NCB/045/2020-2021  
 BILLS OF QUANTITIES

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:4</u></b>				
	<b><u>CO2 Fire Suppression System</u></b>				
	Supply, install, test and commission Carbon dioxide system for Kenya Power Metering rooms with measuring 45m3				
	<b>(This section should be read with Technical specifications of this document where particular specifications for the system are found)</b>				
	<b>Pilot Loop System will not be accepted</b>				
	<b>All components to be UL Listed or FM approved</b>				
1	<b>16kg Co2 Centralised System complete with all accessories fully charged with agent.</b>	No	1		
2	Container Label	No	1		
3	Container Bracket (Strap Type)	No	1		
4	Discharge Hose 50mm	No	1		
5	Actuation mechanism per system - UL Listed	No	1		
6	Manifold for the system complete with lockout, time delay, safety and vent devices	No	1		
	<b>Fire Suppression system control equipment, UL Listed and conforming to EN54 and NFPA standards</b>				
7	Rate of Heat Rise complete with standard base	No	2		
8	Manual Release	No	1		
9	Monitor Module for above	No	1		
10	Sounder-beacon, multi tone, shallow base	No	1		
	<b>Carried Forward</b>			KES	
	Section No. 7 Bill No. 4 GENERATOR A				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES	
11	Control Module for above	No	1		
12	Abort Switch	No	1		
13	Monitor Module for above	No	1		
14	Maintenance Switch	No	1		
15	Monitor Module for above	No	1		
16	Low smoke, 0 halogen, 1.5mm <sup>2</sup> 2 core fire-proof/ flame proof cables and all necessary cabling for all smoke detectors, fire alarm panel and sounders as delta fire-tuff complete with flame-resistant terminations, and accessories. The cables to be capable of withstanding heavy flames for minimum 3 hours.				
	<b>(The tenderers to include for flame testing of the cables for at least 30 minutes)</b>	m	200		
17	24V 2A Power supply module complete with Battery and Accessories	No	1		
18	Warning Sign Inside	No	1		
19	Warning sign outside	No	1		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 4 GENERATOR A					

Brought Forward				KES	
<p><b><u>Pipework (Provisional Subject to Hydraulic Calculations)</u></b></p> <p>Supply and fix seamless black Steel pipes SCH 40 conforming to ASTM A-53A ERW or ASTM A-106 A. All piping shall comply with NFPA 2001.</p> <p>Fittings beyond Orifice union/nipple shall be, 300lb class fittings conforming to ANSI B-16.3. Ordinary cast iron fittings shall not be used. Piping shall be bracketed within 12" (0.3m.) of all discharge nozzles.</p> <p>Tenderers must allow in their pipework prices for all the couplings, unions, sockets, nipples, tees, caps, connectors, joints, anchoring, support brackets etc in running lengths of pipes and also where necessary for fixing clips, holderbats, plugged and screwed.</p>					
20	25mm diameter seamless black Steel pipe as SCH 40	m	2		
21	15mm diameter seamless black Steel pipe as SCH 40	m	10		
22	15mm diameter elbow	No	4		
23	25mm diameter equal tee	No	2		
<p><b><u>360 Degree Nozzle</u></b></p>					
24	15mm Brass Nozzle	No	1		
<p><b>Carried Forward to Summary of Section No. 7</b></p> <p>Section No. 7                      Bill No. 4                      GENERATOR A</p>				KES	

KENYA REVENUE AUTHORITY  
 PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER  
 TENDER REF NO: KRA/HQS/NCB/045/2020-2021  
 BILLS OF QUANTITIES

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:5</u></b>				
	<b><u>CO2 Fire Suppression System</u></b>				
	Supply, install, test and commission Carbon dioxide system for Kenya Power Metering rooms with measuring 45m3				
	<b>(This section should be read with Technical specifications of this document where particular specifications for the system are found)</b>				
	<b>Pilot Loop System will not be accepted</b>				
	<b>All components to be UL Listed or FM approved</b>				
1	<b>16kg Co2 Centralised System complete with all accessories fully charged with agent.</b>	No	1		
2	Container Label	No	1		
3	Container Bracket (Strap Type)	No	1		
4	Discharge Hose 50mm	No	1		
5	Actuation mechanism per system - UL Listed	No	1		
6	Manifold for the system complete with lockout, time delay, safety and vent devices	No	1		
	<b>Fire Suppression system control equipment, UL Listed and conforming to EN54 and NFPA standards</b>				
7	Rate of Heat Rise complete with standard base	No	2		
8	Manual Release	No	1		
9	Monitor Module for above	No	1		
10	Sounder-beacon, multi tone, shallow base	No	1		
	<b>Carried Forward</b>			KES	
	Section No. 7 Bill No. 5 GENERATOR B				



**KENYA REVENUE AUTHORITY**  
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**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES	
11	Control Module for above	No	1		
12	Abort Switch	No	1		
13	Monitor Module for above	No	1		
14	Maintenance Switch	No	1		
15	Monitor Module for above	No	1		
16	Low smoke, 0 halogen, 1.5mm <sup>2</sup> 2 core fire-proof/ flame proof cables and all necessary cabling for all smoke detectors, fire alarm panel and sounders as delta fire-tuff complete with flame-resistant terminations, and accessories. The cables to be capable of withstanding heavy flames for minimum 3 hours.				
	<b>(The tenderers to include for flame testing of the cables for at least 30 minutes)</b>	m	200		
17	24V 2A Power supply module complete with Battery and Accessories	No	1		
18	Warning Sign Inside	No	1		
19	Warning sign outside	No	1		
<b>Carried Forward</b>				KES	
Section No. 7 Bill No. 5 GENERATOR B					

	Brought Forward				KES
	<p><b><u>Pipework (Provisional Subject to Hydraulic Calculations)</u></b></p> <p>Supply and fix seamless black Steel pipes SCH 40 conforming to ASTM A-53A ERW or ASTM A-106 A. All piping shall comply with NFPA 2001.</p> <p>Fittings beyond Orifice union/nipple shall be, 300lb class fittings conforming to ANSI B-16.3. Ordinary cast iron fittings shall not be used. Piping shall be bracketed within 12" (0.3m.) of all discharge nozzles.</p> <p>Tenderers must allow in their pipework prices for all the couplings, unions, sockets, nipples, tees, caps, connectors, joints, anchoring, support brackets etc in running lengths of pipes and also where necessary for fixing clips, holderbats, plugged and screwed.</p>				
20	25mm diameter seamless black Steel pipe as SCH 40	m	2		
21	15mm diameter seamless black Steel pipe as SCH 40	m	15		
22	15mm diameter elbow	No	4		
23	25mm diameter equal tee	No	2		
	<p><b><u>360 Degree Nozzle</u></b></p>				
24	15mm Brass Nozzle	No	1		
	<p><b>Carried Forward to Summary of Section No. 7</b></p> <p>Section No. 7                      Bill No. 5                      GENERATOR B</p>				KES

Bill No	<u>SECTION SUMMARY - FIRE SUPPRESSION SYSTEM</u>	Page No	Amount
1	WHITE SPACE	132	
2	TELECOM A,B, POWER A,B AND SERVER ROOMS	136	
3	KENYA POWER ROOM	139	
4	GENERATOR A	142	
5	GENERATOR B	145	
<b>Carried to Final Summary</b>			
Section No. 7			KES

KENYA REVENUE AUTHORITY  
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**BILLS OF QUANTITIES**

Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:8</u></b>				
	<b><u>BILL NO:1</u></b>				
	<b>Fire Suppression system control equipment, UL Listed and conforming to EN54 and NFPA standards</b>				
1	Modular Fire Alarm Panel comprising of the following:  a) Panel Controller b) Modular Extension housing for 12 modules c) Modular Panel housing for 6 modules d) Power supply bracket compact housing e) Universal power supply with polarity reversal protection f) Panel Rail support g) Panel Rail long h) Batteries (12v) each 24Ah	No	1		
2	Panel Interfaces comprising of the following:  a) Thermal printer b) Mounting frame for thermal printer c) IOS 0020 A 20mA communication module d) Panel module with 2 relay outputs (230V) and two supervised inputs	No	1		
3	Repeater Panel for 2 floors approximately 50 meters away	No	2		
	<b><u>General Office space detection</u></b>				
4	addressable optical sensor	No	10		
5	Rate of Rise Detector	No	4		
6	Addressable Manual Call Point with Isolator	No	2		
7	Sounder-beacon, multi tone, shallow base	No	2		
	<b>Carried Forward</b>			KES	
	Section No. 8 Bill No. 1 FIRE DETECTION SYSTEM				

KENYA REVENUE AUTHORITY  
 PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER  
 TENDER REF NO: KRA/HQS/NCB/045/2020-2021  
 BILLS OF QUANTITIES

Brought Forward				KES	
8	Low smoke, 0 halogen, 1.5mm <sup>2</sup> 2 core fire-proof/ flame proof cables and all necessary cabling for all smoke detectors, fire alarm panel and sounders as delta fire-tuff complete with flame-resistant terminations, and accessories. The cables to be capable of withstanding heavy flames for minimum 3 hours.  <b>(The tenderers to include for flame testing of the            cables for at least 30 minutes)</b>	m	500		
9	Intergration Relay Module with 3rd party	No	4		
10	Bacnet communication module		Item		
<b>Carried Forward to Summary of Section No. 8</b>				KES	
Section No. 8 Bill No. 1 FIRE DETECTION SYSTEM					

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
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**BILLS OF QUANTITIES**

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:2</u></b>				
	<b><u>Access Control Field Devices</u></b>				
	Refer to Specifications of Access Control System. In case of a Conflict between the bills of quantities and specifications in the bills of quantities intention will suffice				
	<b><u>Card Reader</u></b>				
1	Proximity Multi Technology Card Reader	No	32		
	<b><u>Door Lock</u></b>				
2	Door Electro-Magnetic Lock (300KG)	No	19		
3	Door Electro-Magnetic Lock (600KG)	No	5		
4	System Override Key(In event of System Stalling)	No	19		
5	Emergency Break Glass	No	19		
6	Request to Exit Switch	No	5		
7	Power Supply Unit with a Backup Battery (20AH,12v UPS/Battery), inclusive of approximately 50 metres power supply cable to two readers	No	19		
	<b><u>Emergency Exit Doors</u></b>				
8	Wired Door Contact for Fire Exit Doors	No	4		
9	Wired Internal Siren and Strobe for fire exit doors	No	4		
	<b><u>Intelligent Controller</u></b>				
10	Door Controller	No	19		
11	Master IP Controller for above individual controllers (Maximum 32 No.)	No	1		
	<b>Carried Forward</b>			KES	
	Section No. 8 Bill No. 2 CCTV AND ACCESS CONTROL SYSTEM				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
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**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES	
	<b><u>Access Control Licenses</u></b>				
12	Licenses to operate individual Readers described above	No	32		
	<b><u>Cameras</u></b>				
	Refer to Specifications of Video Surveillance System. In case of a Conflict between the bills of quantities and specifications in the bills of quantities intention will suffice				
	<b><u>High Definition (Type I) 90 Degree Camera with Analytics</u></b>				
13	5 MP;1/1/8' progressive scan CMOS: 2592 X 1944: 30M max distance at 0 lux: Lens 4.3- 8 mm ;30fps,83db, SD				
	<b><u>Inclusive of all accessories (Mounting included)</u></b>	No	27		
	<b><u>High Definition Micro Dome Camera</u></b>				
14	MicroDome Duo, 2 Sensor Camera, 4 Megapixel Total, WDR, Remote Focus & Day/Night H.264/MJPEG, SNAPstream, 2 x 1920x1080, 2 x 2.8mm MP Lens, 2 x 3 Axis Gimbals, Surface mount, Indoor/Outdoor, IP66, IK-10, PoE,SD	No	1		
	<b><u>High Definition Bullet Camera with Analytics</u></b>				
15	5 Megapixel, IR, IP bullet cameras, 2.8 - 9.8mm , SD Card, 30 fps,support NAS,POE				
	Include all Accessories (Including Mounting)	No	18		
	<b><u>Camera Licenses</u></b>				
16	Licenses to operate individual cameras described above	No	42		
	<b><u>Local Transmission</u></b>				
	<b><u>Active Components</u></b>				
	<b>Carried Forward</b>			KES	
	Section No. 8 Bill No. 2 CCTV AND ACCESS CONTROL SYSTEM				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

Brought Forward				KES		
	<b><u>IP Network Video Recorder</u></b>					
17	RAID5,RAID6,1080p/5MP/UHD,H.265/H.264,ONVIF, RTSP, RACK MOUNT,2X Gigabit Ethernet, Max Drives supported 16, <b>Base System Capacity 20TB</b> ,External Support for ISCSI,Backup mode Automatic ( <b>NVR to be sourced from the same Manufacturer as the VMS software</b> )	No	2			
18	Network attached storage device <b>60 TB</b>	No	1			
	<b><u>Passive Compnents</u></b>					
19	UTP CAT6A Indoor	m	2,500			
20	8 core Cable	m	3,000			
21	Patch cords RJ45 CAT6A	No	42			
	<b><u>Workstation</u></b>					
22	Viewing CCTV Workstation- Intel Core i7-2600, 8 GB RAM C/W 32" LED Industrial Grade Monitors with mounting accesories	No	1			
	<b><u>ACCESS CONTROL MANAGEMENT SYSTEM</u></b>					
23	Finger Print USB enrollment readers	No	1			
24	Badging Station Complete with the following: 1. Mouse and keyboard. 2. Monitor 3. Badging camera. 4. Badging signature tablet.	No	1			
	<b><u>Access Control Management System</u></b>					
25	Access Control Management System with 2 concurrent user Lincense as per Specifications		Item			
26	Hardware for Running the Access Control and Archiving	No	2			
	<b>Carried Forward to Summary of Section No. 8</b>					
	Section No. 8 Bill No. 2 CCTV AND ACCESS CONTROL SYSTEM			KES		



KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
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**BILLS OF QUANTITIES**

Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:3</u></b>				
	<b><u>Ground Floor</u></b>				
1	CAT 6A F/UTP 4 pair Ethernet Cables as Siemon for 16 cameras, 16 Biometric Readers and 1 IP Master Controller.	m	3,300		
2	Cat 6A 48 port patch panel as Siemon	No	1		
3	1U Horizontal Cable managers	No	1		
4	2U Horizontal Cable managers	No	1		
5	Cisco Switch 48 Port 10/100/1000 POE+with 4 SFP ports, WS-C3650-48PS-S ,with one year smartnet cover	No	1		
6	Cat 6A 1m patchcords for patching in the cabinet as Siemon	No	33		
7	RJ 45 Connectors Metallic with boots	No	66		
8	Supply 4 Core MM OM3 Fiber Cable BETWEEN GROUND FLOOR AND 4TH FLOOR cabinet in Server Room.	m	200		
9	Cisco 1G SFP Module, Multimode	No	1		
10	Supply SC MM connectors	No	2		
11	12U Network Cabinet	No	1		
	<b><u>Third Floor</u></b>				
12	CAT 6A F/UTP 4 pair Ethernet Cables as Siemon for 6 cameras.	m	600		
13	RJ 45 Connectors Metallic with boots	No	12		
	<b>Carried Forward</b>			KES	
	Section No. 8 Bill No. 3 LOCAL AREA NETWORK				

KENYA REVENUE AUTHORITY  
**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
**TENDER REF NO: KRA/HQS/NCB/045/2020-2021**  
**BILLS OF QUANTITIES**

<b>Brought Forward</b>				KES		
<b><u>Fourth Floor</u></b>						
14	Cat 6 single faceplates complete with modules as siemon	No	24			
15	CAT 6A F/UTP 4 pair Ethernet Cables as Siemon for 24 Data Outlets, 21 cameras, 6 Biometric Readers, 1 BMS Master Panel and 2 IP Master Controllers.	m	6,000			
16	Cat 6A 48 port patch panel as Siemon	No	1			
17	Cat 6A 24 port patch panel as Siemon	No	1			
18	2U Horizontal Cable managers	No	1			
19	1U Horizontal Cable managers	No	3			
20	Cisco Switch, 24 Port 10/100/1000 POE+ with 4 SFP ports, <b>9200 Series</b> , with one year smartnet cover	No	1			
21	Cisco Switch 48 Port 10/100/1000 POE+with 4 SFP ports, <b>9200 Series</b> ,with one year smartnet cover	No	1			
22	Cat 6 1m patchcords for patching in the cabinet as Siemon	No	66			
23	Cat 6 3M patchcords for patching on the user end	No	6			
24	RJ 45 Connectors Metallic with boots	No	120			
25	Cisco 1G SFP Module, Multimode	No	3			
26	Supply and install SC MM Adapters	No	3			
27	Supply SC MM connectors	No	6			
28	Supply and Install 12 port fiber patch panel	No	1			
29	Supply 1M MM OM3 SC-SC Fiber Patch Cord	No	3			
<b>Carried Forward</b>				KES		
Section No. 8 Bill No. 3 LOCAL AREA NETWORK						

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<b>Brought Forward</b>				KES	
30	Cisco 3650 stack kits	No	1		
31	Cisco ISR 4000 series ; 1-2G system throughput, 4 WAN/LAN ports, 4 SFP ports, 10 Core CPU, Security, Voice, WAAS, Intelligent WAN, OnePK, AVC, separate control data and services CPUs	No	2		
32	Supply 4 Core MM OM3 Fiber Cable between Core Switch in White Space and 48 port Access Switch in Server Room.	m	70		
33	Supply 25 MM Flex Conduit	m	200		
34	Labor-Racking and Cabling of Servers		Item		
35	Cisco standalone wireless access point as 9100 series	No	4		
36	Labor for Cabling ,installation and Termination			SUM	
37	Splicing,Testing and Commissioning		Item		
38	Testing and labeling of The LAN Network		Item		
<b>Carried Forward to Summary of Section No. 8</b>				KES	
Section No. 8					
Bill No. 3					
LOCAL AREA NETWORK					

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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:4</u></b>				
	<i>Bidders to note that Siemons Factory Pre terminated Plug and Play Copper and Fiber solution has been used as a basis of quality expected equal and approved equivalent will be accepted upon written confirmation by the Engineer</i>				
	<b><u>Cable Managers</u></b>				
1	Horizontal cable manager with five S143 hangers, 1 RMS	No	32		
	<b><u>Copper Accesories</u></b>				
2	Cat6A, Shielded, Z-MAX 6A, RJ45-RJ45, LSOH, T568A/B, White, Stranded, 01M	No	193		
3	Cat6A, Shielded, Z-MAX 6A, RJ45-RJ45, LSOH, T568A/B, White, Stranded, 02M	No	193		
4	Cat6A, Shielded, Z-MAX 6A, RJ45-RJ45, LSOH, T568A/B, White, Stranded, 03M	No	84		
5	PNL, high density, shielded copper/fibre combo, 1U, black	No	34		
6	Z-Max 48 port shielded panel, Empty	No	7		
7	Copper Adapter Plate, 6-port, black	No	29		
	<b><u>Fiber Accesories</u></b>				
8	PNL ASSY, BLANK FILLER PANEL	No	37		
9	PLG&PLY,MODULE,12-PRT,LC,OM4,50-125 10G-MM,BLK LOW LOSS	No	58		
10	ENCLOSURE,LIGHTSTACK,DESCRIPTION 1RMS,BLACK	No	5		
11	ENCLOSURE,LIGHTSTACK,DESCRIPTION 4RMS,BLACK	No	2		
12	PLG&PLY,LIGHT STACK,MODULE,12F,LC,OM4,AQ	No	142		
	<b>Carried Forward</b>			KES	
	Section No. 8 Bill No. 4 WHITE SPACE COMMUNICATION SYSTEM				

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<b>Brought Forward</b>				KES		
13	PLG&PLY,MODULE,12-PRT,LC,OM4,50-125 10G-MM,BLK	m	12			
14	BladePatch, LC - LC, Duplex, OM4, LSOH, 1m	No	400			
15	BladePatch, LC - LC, Duplex, OM4, LSOH, 2m	No	400			
16	BladePatch, LC - LC, Duplex, OM4, LSOH, 3m	No	400			
17	BladePatch, LCU - LCU, Duplex, Single Mode OS1/OS2, LSO	No	24			
18	BladePatch, LCU - LCU, Duplex, Single Mode OS1/OS2, LSOH, 2m	No	24			
19	BladePatch, LCU - LCU, Duplex, Single Mode OS1/OS2, LSOH, 3m	No	24			
<b><u>Plug and Play Copper Trunk</u></b>						
6-LEG, CATEGORY 6A/CLASS EA, F/UTP, SOLID, LSOH (IEC 60332-1), DOUBLE-ENDED, Z-MAX PANEL OUTLET (SHIELDED)-TO-Z-MAX HYBRID OUTLET (ANGLED/FLAT) (BLACK), VIOLET JACKET, EXPANDO (BLACK) WRAP, T568B, 500MHZ						
20	16m	No	4			
21	21m	No	2			
22	22m	No	2			
23	12m	No	2			
24	14m	No	2			
25	15m	No	4			
26	16m	No	3			
27	17m	No	3			
28	18m	No	5			
<b>Carried Forward</b>				KES		
Section No. 8 Bill No. 4 WHITE SPACE COMMUNICATION SYSTEM						

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**PROPOSED REFURBISHMENT OF TIMES TOWER DATA CENTER**  
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		Brought Forward		KES	
29	19m	No	4		
30	20m	No	3		
31	21m	No	1		
32	22m	No	2		
33	24m	No	2		
<b><u>Plug and Play Fiber Trunk</u></b>					
Fiber plug & play Cable assembly, Standard loss Standard Trunk (Female ), 12 Fiber, 9/125 Singlemode OS2, LSOH, xxx Meter, Method C					
34	12m	No	2		
35	14m	No	4		
36	15m	No	8		
37	16m	No	26		
38	17m	No	6		
39	18m	No	10		
40	19m	No	8		
41	20m	No	6		
42	21m	No	12		
43	22m	No	14		
44	24m	No	4		
45	100m	No	6		
<b>Carried Forward to Summary of Section No. 8</b>				KES	
Section No. 8 Bill No. 4 WHITE SPACE COMMUNICATION SYSTEM					

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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:5</u></b>				
1	Samsung VH55R-R Video wall screens or approved Equivalent	No	6		
2	Video Wall Fit for the above flat panel screen;Mounting profile 60-202 mm;Video wall Pop-up function included;Support flat panel Screens upto 45kgs	m	6		
3	Multi Screen Controller Server as 'Matrox' 8x6 input/output complete with cards and operating software	No	1		
4	Lenkeng LKV-683S receivers Lan to Hdmi over Cat5/6 extender with IR & RS232/Audio HDbiT	No	6		
5	Lenkeng LKV-683S transmitters Hdmi to Lan over Cat5/6 extender with IR & RS232/Audio HDbiT	No	6		
6	Ipad with Mura software	m	1		
7	Cat 6 cable 30mts	No	7		
8	Kramer Hdmi cables 15mts	No	14		
	<b>Carried Forward to Summary of Section No. 8</b>			KES	
	Section No. 8 Bill No. 5 VIDEO WALL SYSTEM				

Bill No	<u>SECTION SUMMARY - EXTRA LOW VOLTAGE SYSTEM</u>	Page No	Amount
1	FIRE DETECTION SYSTEM	148	
2	CCTV AND ACCESS CONTROL SYSTEM	151	
3	LOCAL AREA NETWORK	154	
4	WHITE SPACE COMMUNICATION SYSTEM	157	
5	VIDEO WALL SYSTEM	158	
<b>Carried to Final Summary</b>			KES
Section No. 8			



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Item No	Unit	Quantity	Rate	Amount
<p><b><u>BILL NO:1</u></b></p> <p>1 Allow for Structured Off site Training for Client Technical Team complete with certificate of participation for atleast 5No. Personnel for basic trouble shooting and user training for all the installed equipment</p>		Item		
<p><b>Carried Forward to Summary of Section No. 9</b></p>				KES
<p>Section No. 9            Bill No. 1            TRAINING AND KNOWLEDGE TRANSFER</p>				

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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:9</u></b>				
	<b><u>BILL NO:2</u></b>				
1	Allow for Comprehensive testing and commissioning of the entire Electrical Network system using power load bank. Methodology to be approved by Engineer incharge		Item		
2	Allow for Power Quality Analysis after end of defects liability period using Power analyzer		Item		
3	Allow for Comprehensive testing and commissioning of the Generator Installations as per Manufacturer approved Methodology in combination of power load banks as approved by Engineer incharge		Item		
4	Allow for Comprehensive testing and commissioning of the UPS Equipment and Battery Installations as per Manufacturer approved Methodology in combination of power load banks as approved by Engineer in charge		Item		
5	Allow for Comprehensive testing and commissioning of the Air-conditioning Installations as per Manufacturer approved Methodology in combination of Heated fans as approved by Engineer in charge		Item		
6	Allow for Comprehensive testing and commissioning of the Fire Detection and Suppression Installations as per Manufacturer approved Methodology as approved by Engineer in charge		Item		
7	Allow for Comprehensive testing and commissioning of the CCTV, Access Control and Videowall Installations as per Manufacturer approved Methodology as approved by Engineer in charge		Item		
	<b>Carried Forward</b>			KES	
	Section No. 9 Bill No. 2 TESTING AND COMMISSIONING				

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	<b>Brought Forward</b>			KES	
8	Allow for Comprehensive testing and commissioning of the Local Area Network Installations as per Manufacturer approved Methodology as approved by Engineer in charge		Item		
9	Allow for Comprehensive testing and commissioning of the White Space Communication Installations as per Manufacturer approved Methodology as approved by Engineer in charge		Item		
10	Allow for Comprehensive testing and commissioning of the Fuel Storage Installations as per Manufacturer approved Methodology as approved by Engineer in charge		Item		
11	Allow for Comprehensive testing and commissioning of the DCIM Installations as per Manufacturer approved Methodology as approved by Engineer in charge		Item		
<b>Carried Forward to Summary of Section No. 9</b>				KES	
Section No. 9 Bill No. 2 TESTING AND COMMISSIONING					

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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:3</u></b>				
1	Allow for 12 months warranty period for all installed equipment effective date will be upon Practical completion		Item		
2	Allow for 12 months Support,Operating Software Licensing , Maintenance (Labour and Parts)for all equipment as per manufacturer recommendation effective date will be upon achieving practical completion ( <b>Defects Liability Period</b> )		Item		
3	Allow for year One Support,Operating Software Licensing , Maintenance (Labour and Parts)for all equipment as per manufacturer recommendation effective date will be upon <b>Expiry of Defects Liability Period</b>		Item		
4	Allow for year Two Support,Operating Software Licensing , Maintenance (Labour and Parts)for all equipment as per manufacturer recommendation effective date will be upon <b>End of Year One support after Defects Liability Period</b>		Item		
5	Allow for year Three Support,Operating Software Licensing , Maintenance (Labour and Parts)for all equipment as per manufacturer recommendation effective date will be upon <b>End of Year Two support after Defects Liability Period</b>		Item		
	<b>Carried Forward to Summary of Section No. 9</b>			KES	
	Section No. 9 Bill No. 3 MAINTENANCE AND WARRANTY				

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Item No		Unit	Quantity	Rate	Amount
	<b><u>BILL NO:4</u></b>				
1	Acquire and Submit Bank Guarantee of 10% of the Contract Sum as a Performance Guarantee		Item		
2	Acquire and Submit Insurance for Works Described		Item		
3	Allow for the Presentation of all the required samples as per specifications in the bills of quantities.				
	<b>For Items to be imported/Bulky items which are not practical to avail for approval product manuals shall suffice</b>		Item		
4	Prepare and Submit working drawings to the satisfaction of the Engineer both in Hard and Soft in mutually acceptable format		Item		
5	Ditto but 'As Installed'		Item		
6	Prepare and Submit the following project closure documents <b>(The list is not exhaustive)</b> a) Draft Final Account b) Quotations as directed by the Engineer c) User Manuals for all Installed Equipment		Item		
	<b>Carried Forward to Summary of Section No. 9</b>			KES	
	Section No. 9 Bill No. 4 PRELIMINARIES AND GENERAL ITEMS				

Bill No	<u>SECTION SUMMARY - PRELIMINARIES AND GENERAL ITEMS</u>	Page No	Amount
1	TRAINING AND KNOWLEDGE TRANSFER	160	
2	TESTING AND COMMISSIONING	162	
3	MAINTENANCE AND WARRANTY	163	
4	PRELIMINARIES AND GENERAL ITEMS	164	
<b>Carried to Final Summary</b>			KES
Section No. 9			

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Item No		Unit	Quantity	Rate	Amount
	<b><u>SECTION NO:10</u></b>				
	<b><u>BILL NO:1</u></b>				
1	Allow a Sum of KES 20,000,000.00 (In Words Twenty Million) Only to be used as guided by the Current Laws and Regulations		Item		20,000,000.00
	<b>Carried to Final Summary</b>			KES	
	Section No. 10 Bill No. 1 CONTINGENCY SUM				

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Section No	<u>FINAL SUMMARY</u>	Page No	Amount
1	BUILDERS WORKS	16	
2	DEMOLITIONS AND TEMPORARY WORKS	24	
3	GENERATOR AND FUEL SYSTEM	36	
4	GENERAL ELECTRICAL AND ASSOCIATED WORKS	84	
5	INTERGRATED RACK SYSTEMS	120	
6	AIR-CONDITIONING FOR OTHER SPACES	128	
7	FIRE SUPPRESSION SYSTEM	146	
8	EXTRA LOW VOLTAGE SYSTEM	159	
9	PRELIMINARIES AND GENERAL ITEMS	165	
10	CONTINGENCY	166	
	Sub-Total		KES
	Add 16% VAT		KES
	GRAND TOTAL CARRIED FORWARD TO FORM OF TENDER		KES
	<b>Carried to Form of Tender</b>		KES