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| REFERENCE NUMBER: | ERDF.05.121 – Tender 034 | |
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| **Tender for Mechanical and Electrical Engineering as part of ERDF Project ERDF.05.121 – Wildlife Rehabilitation Centre** | | |
| Date Published: | Sunday 13th June 2021 |  |
| Deadline for Submission: | Friday 16th July 2021 | at 12:00am CET/CEST |
| Tender Opening: | Friday 16th July 2021 | at 12:00am CET/CEST |
|  | | |
| |  |  |  | | --- | --- | --- | |  | Operational Programme I – European Structural and Investment Funds 2014-2020  *“Fostering a competitive and sustainable economy to meet our challenges”*  Project part-financed by the European Regional Development Fund  Co-financing rate: 80% European Union; 20% National Funds |  | | | |
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| IMPORTANT | | |
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| Nature Trust Malta  Contact details (c/o Xrobb l-Għaġin Nature Park and Sustainable Development Centre, Triq Xrobb l-Għaġin, Marsaxlokk, Malta,  (+356) 21313150, info@naturetrustmalta.org) | | |

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# SECTION 1 – INSTRUCTIONS TO TENDERERS

|  |  |  |
| --- | --- | --- |
|  | 1. General Instructions | |
|  |  | |
| 1.1 | In submitting a tender, the tenderer accepts in full and in its entirety, the content of this tender document, including subsequent Clarifications issued by the Non Governmental Organisation (NGO), whatever the economic operator’s own corresponding conditions may be, which through the submission of the tender is waived. Tenderers are expected to examine carefully and comply with all instructions, forms, contract provisions and specifications contained in this tender document. These Instructions to Tenderers complement the General Rules Governing Tenders for NGOs.  No account can be taken of any reservation in the tender in respect of the procurement documents; any disagreement, contradiction, alteration or deviation shall lead to the tender offer not being considered any further.  Prospective tenderers must submit their offer by depositing it in the tender box, located at *Xrobb l-Għaġin Nature Park and Sustainable Development Centre, Triq Xrobb l-Għaġin, Marsaxlokk, Malta*. Prospective tenders take full responsible to submit their offer by the set tender submission deadline.  Note:  Where in this tender document a standard is quoted, it is to be understood that the Contracting Authority will accept equivalent standards. However, it will be the responsibility of the respective bidders to prove that the standards they quoted are equivalent to the standards requested by the Contracting Authority.  The Estimated Procurement Value for this Call for Tenders has been based on comprehensive research including appropriate financial analysis. In the context of this procurement, the Estimated Procurement Value, based on market research, is that of € €322,511.37 excluding VAT.  The purpose of this value shall be the guidance of prospective bidders when submitting their offer and is not to be considered as a binding capping price.  Therefore, the published Estimated Procurement Value is not restrictive and final on the Contracting Authority. Economic Operators are free to submit financial offers above or below the Estimated Procurement Value. However, the Contracting Authority reserves the right to accept or reject Financial Offers exceeding the Estimated Procurement Value | |
| 1.2 | The subject of this tender is the provision of the following works:   * Electrical Installation and UPS System * Mechanical Services Installation including plumbing and sewerage systems * Extra Low Voltage installation   related to the Wildlife Rehabilitation Centre to be established at Xrobb l-Għaġin, as part of ERDF.05.121 – WILDLIFE REHABILITATION CENTRE | |
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| 1.3 | The place of acceptance of the services shall be the still unrestored part of the ex-Deutsche Welle radio relay station at Xrobb l-Għaġin Natural Park, the time-limits for the execution of the contract shall be three years from last date of signature on contract, and the INCOTERM2020 applicable shall be Delivery Duty Paid (DDP). | |
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| 1.4 | This is a unit-price contract. | |
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| 1.5 | This call for tenders is being issued under an open procedure. | |
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| 1.6 | The beneficiary of this tender is *Nature Trust – FEE Malta*. | |
| 1.7 | This tender is not a reserved contract. | |
|  | 2. Timetable | |
|  |  | |
| 2. | |  |  |  | | --- | --- | --- | |  | DATE | TIME | | Clarification Meeting/Site Visit (Refer to Clause 6.1) | Friday 18th June 2021 | 10:30 hrs | | Deadline for request for any additional information from the NGO  Clarification requests should be addressed to: *info@naturetrustmalta.org* | Wednesday 30th June 2021 | 12:00 hrs  (noon) | | Last date on which additional information can be issued by the NGO | Monday 5th July 2021 | 12:00 hrs  (noon) | | Deadline for submission of tenders/Tender opening session  (unless otherwise modified in terms of Clause 10.1 of the  General Rules Governing Tendering for NGOs) | Friday 16th July 2021 | 12:00 hrs  (noon) | | \* All times Central European Time (CET) / Central European Summer Time (CEST) as applicable | | | | | |
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|  | 3. Lots | |
|  |  | |
| 3.1 | This tender is not divided into lots, and tenders must be for the whole of quantities indicated. Tenders will not be accepted for incomplete quantities.  Given the complexity and nature of the tender, a single contractor can carry out the works related to the installations forming part of this tender | |
|  |  | |
| 4.1 | 4. Variant Solutions  Variant solutions are not permissible. | |
|  | 5. Financing | |
| 5.1 | The project is *co-financed* by the European Union/Government of Malta, in accordance with the rules of European Regional Development Fund (ERDF) Operational Programme 1 - Co-financing rate: 80% European Union; 20% National Funds | |
| 5.2 | The Contracting Authority of this tender is *Nature Trust Malta* | |
|  |  | |
|  | 6. Clarification Meeting/Site Visit/Workshop | |
|  |  | |
| 6.1 | A clarification meeting/site visit will be held on the date and time indicated in Clause 2, at Xrobb l-Għaġin Nature Park to answer any questions on the tender document which have been forwarded in writing, or are raised during the same meeting. Minutes will be taken during the meeting, and these (together with any clarifications in response to written requests which are not addressed during the meeting) shall be posted online on the NGOs website as a clarification note as per Clause 6.1 of the General Rules Governing Tendering for NGOs.  Meetings between economic operators and the NGO, other than that provided in this clause during the tendering period are not permitted. | |
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|  | 7. Selection and Award Requirements | |
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|  | In order to be considered eligible for the award of the contract, economic operators must provide evidence that they meet or exceed certain minimum criteria described hereunder. (Note 2) | |
|  |  | |
|  | (A) Eligibility Criteria | |
|  | (i)  (ii) | No Bid Bond is required.(Note 1)  Declare agreement, conformity and compliance with the provisions of the Statement on Conditions of Employment by completing and submitting the form with title Statement on Conditions of Employment. |
|  | (iii)  (iv) | Power of Attorney (if applicable) (Note 2)  Information re Joint Venture/Consortium (Note 2) |
|  | (B) Exclusion (including Blacklisting) and Selection Criteria – information to be submitted through the completion of the following declaration forms: | |
|  | (i) | Declaration concerning exclusion grounds |
|  | (ii) | Declaration concerning *Selection Criteria* |
|  |  | |
|  | (C) Technical Specifications | |
|  | The bidder is to comply with the technical specifications as outlined under Section 4 (Terms of Reference) of this tender document and submit the following documentation: | |
|  | (i) | Tenderer’s Technical Offer in response to specifications – Bidders shall use the form provided. (Note 3) |
|  | (ii) | Key Experts Form(Note 2), the Statement of Exclusivity and Availability Form(Note 2), and, if applicable, Public Employees Declaration Form(Note 2), in respect of:   * Warranted Engineer * Electrical Technician with both an A and B license |
|  | (iii) | Literature as per Form marked ‘Literature List’ to be submitted with the Technical offer at tendering stage. Alternatively, an Economic Operator can quote a reference number under which he/she has already supplied items so that there would be no need to submit literature. (Note 2) |
|  | (iv) | No Samples will be requested at evaluation stage to supplement the technical offer submitted. |
|  | (D) Financial Offer | |
|  |  | |
|  | (i)  (ii) | The Tender Form and Tenderer’s Declaration are to completed and submitted with the offer; a separate Tender Form is to be submitted for each option tendered, each form clearly marked ‘Option 1’, ‘Option 2’ etc.; (Note 3)  A financial offer is to be submitted by filling in Financial Bid Form, and is to be calculated on the basis of **Delivered Duty Paid (DDP)2020 (Grand Total)** for the works tendered.(Note 3) |
|  |  | |
|  | Notes to Clause 7:  1. Tenderers will be requested to clarify/rectify, within five (5) working days from notification, the tender guarantee only in the following four circumstances: incorrect validity date, and/or incorrect value, and/or incorrect addressee and incorrect name of the bidder. Rectification in respect of the Tender Guarantee (Bid Bond) is free of charge.  2. A) Tenderers will be requested to either clarify/rectify any incorrect and/or incomplete documentation, and/or submit any missing documents within five (5) working days from notification.  3. No rectification shall be allowed. Only clarifications on the submitted information may be requested.  Request for Clarification and / or rectifications concerning a previous request dealing with the same shortcoming shall not be entertained. | |
| 8.1 | 8. Tender Guarantee (Bid bond)  No tender guarantee (bid bond) is required. | |
|  | 9. Criteria for Award | |
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| 9.1 | The sole award criterion will be the price. The contract will be awarded to the tenderer submitting the cheapest priced offer satisfying the administrative and technical criteria. | |
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# SECTION 2 – EXTRACTS FROM THE PUBLIC PROCUREMENT REGULATIONS

Part **X** of the Public Procurement Regulations

270. Any tenderer or candidate concerned, or any person, having or having had an interest or who has been harmed or risks being harmed by an alleged infringement or by any decision taken including a proposed award in obtaining a contract, a rejection of a tender or a cancellation of a call for tender after the lapse of the publication period, may file an appeal by means of an objection before the Review Board, which shall contain in a very clear manner the reasons for their complaints.

271. The objection shall be filed within ten calendar days following the date on which the NGO has by fax or other electronic means sent its proposed award decision or the rejection of a tender or the cancellation of the call for tenders after the lapse of the publication period.

272. The communication to each tenderer or candidate concerned of the proposed award or of the cancellation of the call for tenders shall be accompanied by a summary of the relevant reasons relating to the rejection of the tender as set out in regulation 242 or the reasons why the call for tenders is being cancelled after the lapse of the publication period, and by a precise statement of the exact standstill period.

273. The objection shall only be valid if accompanied by a deposit equivalent to 0.50 per cent of the estimated value set by the NGO of the whole tender or if the tender is divided into lots according to the estimated value of the tender set by the NGO for each lot submitted by the tenderer, provided that in no case shall the deposit be less than four hundred euro (€400) or more than fifty thousand euro (€50,000) which may be refunded as the Public Contracts Review Board may decide in its decision.

274. The Secretary of the Review Board shall immediately notify the Director and/or the NGO as the case maybe that an objection had been filed with his authority thereby immediately suspending the award procedure.

275. The NGO involved, as the case may be, shall be precluded from concluding the contract during the period of ten calendar days allowed for the submission of appeals. The award process shall be completely suspended if an appeal is eventually submitted.

276. The procedure to be followed in submitting and determining appeals as well as the conditions under which such appeals may be filed shall be the following:

1. any decision by the General Contracts Committee or the Special Contracts Committee or by the NGO shall be made public by affixing it to the notice-board of the same NGO as the case may be or by uploading it on Government’s e-procurement platform prior to the award of the contract if the call for tenders is administered by the NGO;
2. the appeal of the complainant shall also be affixed to the notice-board of the Review Board and shall be communicated by fax or by other electronic means to all participating tenderers;
3. the NGO and any interested party may, within ten calendar days from the day on which the appeal is affixed to the notice-board of the NGO and uploaded if/where applicable on the Government’s e-procurement platform, file a written reply to the appeal. These replies shall also be affixed to the notice-board of the Review Board and where applicable it shall also be uploaded on the Government’s e-procurement platform;
4. within three working days of the publication of the replies, the Secretary of the Review Board shall prepare a report (the Analysis Report) analysing the appeal and any reply to it. This report shall be circulated to the persons who file an appeal and to all parties who submitted a reply to the appeal;
5. after the preparatory process is duly completed, the Director or the Head of the NGO shall forward to the Chairman of the Review Board all documentation pertaining to the call for tenders in question including files, tenders submitted, copies of deposit receipts and any motivated letter;
6. The secretary of the board shall inform all the participants of the call for tenders, the NGO of the date or dates as the case maybe when the appeal will be heard;

(g) When the oral hearing is concluded, the Public Contracts Review Board, if it does not deliver the decision on the same day, shall reserve decision for the earliest possible date to be fixed for the purpose, but not later than six weeks from the day of the oral hearing:

Provided that for serious and justified reasons expressed in writing by means of an order notified to all the parties, the Public Contracts Review board may postpone the judgment for a later period.

(h) The secretary of the board shall keep a record of the grounds of each adjournment and of everything done in each sitting;

(i) After evaluating all the evidence and after considering all submissions put forward by the parties, the Review Board shall decide whether to accede or reject the appeal.

SECTION 3 – SPECIAL CONDITIONS

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| These conditions amplify and supplement, if necessary, the General Conditions governing the contract. Unless the Special Conditions provide otherwise, those General Conditions remain fully applicable. The numbering of the Articles of the Special Conditions is not consecutive but follows the numbering of the Articles of the General Conditions. Other Special Conditions should be indicated afterwards.  For the purposes of contracts issued by NGOs, the term ‘approval from the Central Government Authority’ shall be substituted by the term ‘approval by the Head responsible for that NGO’; Furthermore, any references to the  Contracting Authority throughout the General Conditions shall be deemed to be referring to the NGO responsible for that procurement. |
| Article 2: Law and language of the Contract |
| The Laws of Malta shall apply in all matters not covered by the provisions of the contract. |
| The language used shall be English. |
|  |
| Article 3: Order of Precedence of Contract Documents |
| The contract is made up of the following documents, in order of precedence:  (a) the Contract;  (b) the Special Conditions;  (c) the General Conditions;  (d) the Contracting Authority’s technical specifications and design documentation;  (e) the Contractor’s technical offer, and the design documentation (drawings);  (f) the bill of quantities/financial bid (after arithmetical corrections)/breakdown;  (g) the tender declarations in the Tender Response Format;  (h) any other documents forming part of the contract.  Addenda have the order of precedence of the document they are modifying. |
| Article 4: Communications |
| Any communication shall be carried out with:  Nature Trust Malta,  c/o Xrobb l-Għaġin Nature Park and Sustainable Development Centre,  Triq Xrobb l-Għaġin, Marsaxlokk, Malta  Email: [info@naturetrustmalta.org](mailto:info@naturetrustmalta.org)  Communications shall preferably be carried out by email.  Any requests for clarifications and the relevant reply shall be posted online on the website [www.naturetrustmalta.org](http://www.naturetrustmalta.org) in an anonymised form. |
| Article 5: Supervisor and Supervisor's Representative |
| As per General conditions  5.8 Without prejudice to the General Conditions, any to any other reference in the present tender document, the Supervisor shall refer to:   * the Consultant Engineer engaged by the Contracting Authority   5.9 Without prejudice to the above, unless otherwise specified in the text, any reference to Engineer, shall refer to:   * the Consultant Engineer engaged by the Contracting Authority   5.10 Without prejudice to the above, unless otherwise specified in the text, any reference to Architect, shall refer to:   * the Consultant Architect and Civil Engineer engaged by the Contracting Authority |
| Article 8: Supply of Documents |
| 8.4 During Tender Implementation, bidders shall be submitting documents as follows:  i. Prior to the commencement of works, the Contractor shall provide the Contacting Authority with:   * A report detailing the **Health and Safety Assessment, including risk mitigation measures to be adopted,** for the carrying out of the necessary works for the tender implementation up to commissioning. It shall outline all risks involved and measures to be taken to minimise or eliminate potential risks. The report is to be prepared and signed by a competent person and to be submitted **within two weeks** from last signature of Contract. (vide Section 4, Sub/Section 4.1.2) * The Performance Programme as per Article 15 of these Special Conditions. It shall faithfully reflect the Gantt chart submitted by the bidder at Tendering Stage together with the Tender document, as well as include the Method Statement identified in Article 5.2.7 of the technical Specifications **within two week** from last signature of Contract. * Working drawings, diagrams, schedules of materials, etc., necessary, to be submitted to the Consultant Engineer for approval before proceeding with the works **within two week** from last signature of Contract.   2. During project implementation, the Contractor shall provide the Contracting Authority with documentation concerning the following:   * Accompanying each invoice (with the exception of the invoice relative to pre-financing), a report, certified by the Contractor’s Engineer detailing the works in respect of which the invoice is being issued. Such a report shall attest the quality of works and materials as being in line with the applicable standards as defined in Section 4 of the present Tender Document, providing substantiating documents in the form of tests, certificates and photographs.   Without prejudice, to the generality of the above, inter alia, any measurement shall be accompanied by photo/s showing the measurements/tests being taken, and the relevant dimension/ measurement being according to the specification outlined in Section 4. Each photo shall show the date when it was taken.  No payment will be effected unless such a comprehensive report is provided and approved by the Contracting Authority. The Contracting Authority may seek as many revisions as necessary to such report/s.  3. At commissioning stage, or final installation, the Contractor shall provide:   * Full set of as fitted drawings. These shall include 1 hard copy and a digital copy on 2 separate USBs. |
| Article 10: Assistance with Local Regulations |
| As per General Conditions. |
|  |
| Article 11: The Contractor’s Obligations |
| Without prejudice to the General Conditions, the Contractor shall be bound with the following obligations:   * The contractor binds himself to adhere to the conditions imposed in the Planning Permit, that is, the approved drawings, document and conditions imposed in Planning Permit PA NO/1659/17 and PA No / 1660/17 as approved by the Planning Authority. * The Programme of Works identified as part of Article 11.9 of the General Conditions shall be construed to be Performance Programme as per Article 15 of these Special Conditions. It shall faithfully reflect the Gantt chart submitted by the bidder at Tendering Stage together with the Tender document, as well as include the Method Statement identified in Article 5.2.7 of the technical Specifications. * With regards to Article 11.11 of the General Conditions, following completion of works, provide any drawings identified in Article 8 of these Special Conditions. * Any correspondence related to the contract shall be delivered to the address specified by the Contractor in the Tender Form. The Contractor is bound to notify the Contracting Authority immediately of any change to the said address. If the Address is established in any other Eu country, the Contractor shall designate an agent based in Malta, and provide the address of such an agent. Mutatis mutandis, any change of address shall be notified immediately to the Contracting Authority. * During the execution of the contract, any communication, including any documents and/or drawings shall be submitted to the Supervisor by email. The Supervisor shall review the relevant communication internally and reply in writing. |
|  |
| Article 13: Performance Guarantee |
| **13.1** The Contractor shall, within 15 calendar days of receipt of the contract, sign and date the contract and return it together with a copy of the Performance Guarantee. The copy of the Performance Guarantee forwarded to the Central Government Authority is to be endorsed by the Contracting Authority prior to submission. The Contract will not be endorsed by the Contracting Authority / NGO until the Performance Guarantee is submitted. The Contractor is therefore obliged to forward the original Performance Guarantee to the Contracting Authority. The amount of the guarantee shall be 4% where the amount of the total contract value is between €10,000 and €500,000 exclusive of VAT, and 10% where the amount of the total contract value is €500,000 or above. |
|  |
| The performance guarantee shall be in the format given in Section 5 and shall be provided in the form of a bank guarantee. It shall be issued by a bank in accordance with the eligibility criteria applicable for the award of the contract.  Economic Operators have the possibility to provide the Contracting Authority with a Single Bond covering the performance guarantees for all the contracts with the same Contracting Authority. If an additional contract is awarded to a given contractor, which results in an economic operator’s current cumulative contracts value to go beyond the contract value range currently covered by the Single Bond, the contractor is to be requested to; either submit a separate Performance Guarantee for the additional contract; or else submit a new Single Bond to cover the new total contracts value or submit an amendment to the original Single Bond specifying the new amount. If an Economic Operator chooses to make use of the Single Bond, he must submit a letter from the respective Contracting Authority specifying that the amount of the Single Bond covers the new Contract, otherwise the new Contract Agreement would not be signed. |
| The performance guarantee shall be released as per Article 13.9 of the General Conditions. |
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| Article 14: Insurance |
| Not Applicable |
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| Article 15: Performance Programme (Timetable) |
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| 15.1 The Contractor shall submit a Performance Programme which shall also include:  a) the order in which the Contractor proposes to carry out the works;  b) the deadlines for submission and approval of the drawings;  c) a general description of the methods which the Contractor proposes to adopt for carrying out the works; and  d) such further details and information as the Supervisor may reasonably require  The Performance Programme shall ensure that all works are completed within five (5) months from Signature of Contract |
| 15.2 Submission of relevant Health and Safety report and Method Statements as Identified in Article 8 of these Special Conditions within one (1) week from Signature of Contract |
| 15.3 As per General Conditions |
|  |
| Article 17: Contractor’s Drawings/Diagrams |
| The Contractor shall submit to the Supervisor for approval:  a) drawings as per Article 8 of these Special Conditions, according to the time limits set in Article 15.2 of these Special Conditions. Such drawings shall be submitted to the Supervisor. |
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| Article 18: Tender Prices |
| As per General Conditions |
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| Article 20: Safety on Site |
| 20.2 Further to the provisions of the General Conditions, it is the obligation of contractors to carry out a suitable, sufficient and systematic assessment of all the occupational health and safety hazards which may be present at the place of work and the resultant risks involved concerning all aspects of the work activity. Such an Assessment shall be submitted as per Article 8 of these Special Conditions. |
| 20.3 Further to the provisions of the General Conditions, it is also the duty of a contractor to cooperate with other employers, contractors and, or self-employed persons who share a common work place, on the implementation of Health and Safety provisions. The contractor or his designate shall co-ordinate necessary actions in matters which concern protective and preventive measures, and shall inform all on site as well as the Project Supervisor regarding any potential risks. |
|  |
| Article 22: Interference with Traffic |
| Not applicable |
|  |
| Article 25: Demolished Materials |
| Not applicable |
|  |
| Article 26: Discoveries |
| As per General Conditions |
|  |
| Article 28: Soil Studies |
| Not applicable |
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| Article 30: Patents and Licenses |
|  |
| As per General Conditions |
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| Article 31: Commencement Date |
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| The commencement date for the performance of the contract shall be the last date of signature of contract. |
|  |
| Article 32: Period of Execution of Tasks |
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| The Works shall be completed within 5 months from the Commencement Date. |
|  |
| Article 34: Delays in Execution |
| A daily penalty of 1/1000 of the contract price per day’s delay up to a limit of 20% of the total contract price.  Without prejudice to the above, should the delays result in the Contracting Authority / NGO missing out on any ERDF funds related to the contract, the Contractor shall be liable for any loss of funds incurred. |
|  |
| Article 35: Modification to the Contract |
| As per general Conditions |
|  |
| Article 37: Work Register |
| 37.1 As per general Conditions |
| 37.3 Without prejudice to the General conditions, statements shall be drawn in a timely manner and not later than 24 hours after the occurrence of an event/activity/work. |
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| Article 38: Origin |
|  |
| As per general conditions |
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| Article 39: Quality of Works and Materials |
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| As per Section IV of the Tender Document  No preliminary technical acceptance is envisaged. Quality of works and materials shall be certified by the Contractor’s Engineer as being in line with the applicable standards as defined in Section 4 of the present Tender Document, providing substantiating documents in the form of tests, certificates and photographs. Without prejudice, to the generality of this clause, interalia, any measurement /test shall be accompanied by photo/s showing the measurements /tests being taken, and, if applicable, showing results thereof. Each photo shall show the date when it was taken. No payment will be effected unless such a comprehensive report is provided by the Contractor and approved by the Contracting Authority. The Contracting Authority may seek as many revisions as necessary to such report/s.  Without prejudice, the Supervisor may reject and/or approve the quality of works taking into consideration any certification provided, any results from tests mandated by the said specifications or requested by the Consultant Engineer in charge, or any inspection carried out. The decision by the Supervisor shall be final.  Any rejection shall cause the contractor to re-do the defaulting works, at no additional cost to the Contracting Authority. |
|  |
| Article 40: Inspection and Testing |
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| The Consultant Engineer in charge has the right to request tests as specified in Section IV of the Tender Document. These tests will be carried out at the expense of the contractor. |
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| Article 42: Ownership of Plants and Materials |
|  |
| As per General Conditions |
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| Article 43: Payments: General Principles |
|  |
| As per General Conditions |
| 43.6 Payments shall be authorized by the Contracting Authority, and paid by the Treasury Department on the basis of work carried out, and certified as such by the Consultant Engineer in charge of the present tender. |
| 43.7 Invoices are to be accompanied by the a report, signed by the Contractor’s Engineer as being in line with the applicable standards as defined in Section 4 of the present Tender Document. Such report shall include substantiating documents in the form of tests, certificates and photographs. Without prejudice, to the generality of this clause, interalia, any measurement shall be accompanied by photo/s showing the measurements being taken, and the relevant dimension/ measurement – test being according to the specification outlined in Section 4. Each photo shall show the date when it was taken. No payment will be effected unless such a comprehensive report is provided and approved by the Contracting Authority. The Contracting Authority may seek as many revisions as necessary to such report/s prior to effecting payment. An invoice shall be considered only as approved when the accompanying report is approved. |
|  |
| Article 44: Pre-financing |
|  |
| 44.1 The Contractor must request a pre-financing for operations connected with the execution of the works, in the cases listed hereinafter:  a) as a lump sum advance enabling him to meet expenditure resulting from the commencement of the contract - the amount of pre-financing shall be 20% of the original contract price;  b) if he affords proof of the conclusion of a contract for the purchase or order of materials, plant, equipment, machines and tools necessary for the execution of the contract, and of any other substantial prior expenses such as the acquisition of patents or study costs, the amount of prefinancing in referred to in Article 44.1(a), the lump sum advance may be increased by 10% of the contract price.  Such pre-financing shall not be higher than 30% of the contract award.  The Contractor shall provide the Contracting Authority with a pre-financing guarantee for the value of the said pre-financing, within 30 days from the last signature of contract. Such a guarantee shall be issued by a bank as per template provided by the Contracting Authority.  The pre-financing guarantee shall be released as per General Conditions. All other General Conditions apply. |
|  |
| Article 45: Retention Monies |
|  |
| N/A |
|  |
| Article 46: Price Revision |
|  |
| 46.1 Without prejudice to the General Conditions, no price revision is possible. |
| 46.2 Prices contained in the Contractor's tender shall be deemed:   1. to have been determined on the basis of the conditions in force up to the date fixed for submission of tenders, in the case of direct agreement contracts, on the date of the contract; 2. to have taken account of the legislation and the relevant tax arrangements applicable at the reference date fixed in sub-criteria(a). |
|  |
| **46.3** In the event of changes to, or introduction of, any national or state statute, ordinance, decree or other law, or any regulation or bye-law of any local or other public authority, after the date fixed for the submission of tenders, which causes a change in the contractual relationship between the parties to the contract, the Contracting Authority and the Contractor shall consult, together and with the Managing Authority responsible for the Management of ERDF funds on how best to proceed further under the contract, and may as a result of such consultation decide, with the prior approval of the Central Government Authority:   1. to modify the contract; or 2. to provide for compensation for any imbalance caused by one Party to the other; or to terminate the contract by mutual agreement. |
|  |
| Article 47: Measurement |
|  |
| As per General Conditions. |
|  |
| Article 48: Interim Payments |
|  |
| As per General Conditions.  Without prejudice to the General Conditions any application for interim payment shall be submitted in the form of an invoice, compiled in line with the applicable legislation (VAT Act etc.) and shall specify each Bill of Quantity item (henceforth cost item) to which they relate. Nothing shall preclude the Contractor from submitting an invoice relative to more than one cost item, provided each cost item is uniquely identified, measured, and costed. Invoices shall be accompanied by a report as per Article 43.7 of these Special Conditions. |
|  |
| Article 50: Delayed Payments |
|  |
| **50.1** The Contracting Authority shall pay the contractor sums due within 60 days of the date on which an admissible payment is registered and approved, in accordance with Article 43 of these Special Conditions. This period shall begin to run from the approval of these documents by the Contracting Authority. These documents shall be approved either expressly or tacitly, in the absence if any written reaction in the 30 days following their receipt accompanied by the requisite documents. |
|  |
| Once the deadline laid down in Article 50.1 has expired, the Contractor may, within two months of late payment, claim late-payment interest: |
| * at the rediscount rate applied by the issuing institution of the country of the Contracting Authority; * on the first day of the month in which the deadline expired, plus two percentage points (2%). The late-payment interest shall apply to the time which elapses between the date of the payment deadline (exclusive) and the date on which the Contracting Authority's account is debited (inclusive). |
|  |
| Article 53: End Date |
|  |
| The Project ERDF 05.121 WILDLIFE REHABILITATION CENTRE is scheduled to be completed by the third quarter 2021.  Without prejudice, the Contractor is bound by the timeframes established in as per Article 15 of these Special Conditions. |
|  |
| Article 56: Partial Acceptance |
| Not applicable |
|  |
| Article 57: Provisional Acceptance |
|  |
| Without prejudice to the General Conditions, the Contracting authority will:   1. Issue a provisional acceptance certificate for each sperate bill, following the certification of works for that category by the Supervisor. 2. If applicable, the certification indicated in the above sub-clause 1 shall only be issued after the relevant tests have been carried out, and the Supervisor has deemed the results as satisfactory.   If applicable, the certification indicated in the above sub-clause 1 shall only be issued after the Contractor has provided the Contracting Authority with a properly documented report and the Project Manager and Supervisor have confirmed that items are in line with the technical specifications. |
|  |
| Article 58: Maintenance Obligations |
|  |
| The Contractor shall make good for any issues which may arise to the installations during a warranty period of twenty-four (24) months from Commissioning. |
|  |
| Article 66: Dispute Settlement by Litigation |
| If no settlement is reached within 120 days of the start of the amicable dispute-settlement procedure, each Party may seek:  a) either a ruling from a national court, or  b) an arbitration ruling, in the case where the parties, i.e. the Contracting Authority and the Contractor, by agreement decide to refer the matter to arbitration. |
|  |
| Article 70: Further Additional Clauses |
| Not Applicable |

# SECTION 4 –SPECIFICATIONS/TERMS OF REFERENCE (Note 3)

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| --- |
| Note:  Where in this tender document a standard is quoted, it is to be understood that the NGO will accept equivalent standards. However, it will be the responsibility of the respective bidders to prove that the standards they quoted are equivalent to the standards requested by the NGO. |

# 1.0 Background Information

* 1. The information in this section is being provided by way of background, and for the information of potential bidders.
  2. The aim of the ERDF PROJECT ERDF.05.121 – WILDLIFE REHABILITATION CENTRE is primarily to set up a Wildlife Rehabilitation Centre to provide ex-situ rehabilitation of wildlife from across Malta and surrounding seas: marine (turtles and cetaceans), terrestrial (such as hedgehogs, shrews, lizards, snakes and bats) and avian fauna. Following rehabilitation, if possible, they will be released into their natural habitat. It should be a unique, all year round visitor attraction visitors with the opportunity to interact with the rehabilitating wildlife.
  3. The Contracting Authority, in partnership with the Ministry for the Environment, Sustainable Development and Climate Change was successful in its submission for ERDF funds to fund the setting-up of this Centre. In this regard, any work on the project has to be carried out within the parameters defined by the Grant Agreement entered into by NTM and the Managing Authority for ERDF funds. The Planning and Priorities Coordination Division (PPCD) within the Parliamentary Secretariat for the Parliamentary Secretary for EU Funds and Social Dialogue, within the Ministry for European Affairs and Equality is the designated Managing Authority (MA) responsible for the overall coordination and management of the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) under Operational Programme I (2014-2020). The MA issues calls for proposals for ERDF and CF at different intervals of the Programme’s lifetime. The project was successful under one such call.
  4. The present infrastructure for ex-situ conservation in Malta is, to say the least, quite limited and to date the rehabilitation of such species has been carried out in a piecemeal manner, mainly by NTM, through its Wildlife Rescue Team which provides rescue services for both marine and terrestrial fauna on a 24/7 basis. The team is composed of a group of volunteers, made up of divers, biologists and marine mammal medics who are covered by permits from the Environment and Resource Authority (ERA) to respond to calls for the handling of local protected wildlife. Injured turtles and cetaceans are taken to San Lucjan’s Rehabilitation Centre and/or a veterinarian’s clinic where they are treated by or under the supervision of a qualified veterinarian. Other animals (including hedgehogs, lizards, chameleons, shrews, bats, wild rabbits, and weasels), after being examined by a veterinarian, are taken, under ERA permit to the volunteer’s homes where they are treated, medicated and taken care of until they may be released once more into the wild. Turtles are released during dedicated events in the presence of the media and distinguished guests, amongst others, as part of an effort to raise awareness about risks to biodiversity and rehabilitation efforts. Other species are released by the volunteers at the place of rescue or in a nearby protected area.
  5. The project will also cater for CITES animals which are presently hosted at the Small Animal Quarantine facilities in Luqa, which is managed by the Ministry for Sustainable Development, Environment and Climate Change. The site was designed to host small animals and pets (dogs, cats and ferrets) who do not meet all the requirements for entry into Malta under the Pet Passport scheme, for a short period of time in quarantine to minimise the risk of disease being brought into the islands. However, CITES species that are found in Malta illegally, are also kept there until their position is regularised and/or they may be returned to their country of origin or released into the wild.
  6. The Wildlife Rehabilitation Centre will be hosted in part of the ex-Deutsche Welle radio relay station at Xrobb l-Għaġin Natural Park. It will compliment a first project in the area carried out between 2007 and 2011 through a grant from Iceland, Liechtenstein and Norway though the EEA financial mechanism and the Norwegian financial mechanism, which project saw the rehabilitation of a hitherto degraded area and some of the derelict buildings in the area into a natural park and a Sustainable Development Centre. That project had left some buildings unutilised, and thus still in a derelict state. The present project is proposing the rehabilitation of those buildings and their use as parts of the proposed Wildlife Rehabilitation Centre.

# 2.0 Onus to comply with existing legislation

The contractor shall respect all laws and regulations in Malta, including but not limited to occupational health and safety regulations, and environmental regulations. The contractor shall operate in a manner that does not cause any damage to adjacent properties and areas, including the existing Sustainable Development Centre and all structures forming part of the complex.

The contractor shall operate in a manner that does not disrupt the normal operations of the Sustainable Development Centre. In case of extraordinary works, agreement is to be reached on the method and period of activity in advance between Nature Trust Malta and the Contractor so as to cause the least disruption possible.

Without prejudice to the generality of this section, the Contractor shall have prepared, by a Competent Person in Health and Safety as per OHSA Act, an assessment of Health and Safety risks and mitigation measures to be adopted during the works to be carried out.

# 3.0 Onus to Work Together and Provide Access

Whereas three different contractors may be responsible for the works forming part of this Project, Contractors shall work together, allow access to the respective sites, and not hinder the work of the other contractors working on any other works-supplies on site.

Bidders shall be held liable for any loss of funds or delays incurred by the Contracting Authority due to any non-collaboration between each other.

# 4.0 SPECIFICATION FOR THE INSTALLATION OF ELECTRICAL SERVICES

The following installations shall be suitable for a saline environment. Hence, all installations shall be of polycarbonate construction or stainless steel 316L construction, installations using equipment with aluminium construction shall not be acceptable.

## PREAMBLE TO THE SPECIFICATION

The work covers the installation of Electrical Services at the Nature Trust Building at Xrobb L-Ghagin, and includes for the supply and installation of all switchgear, cables, conduit, trunking and wiring accessories, complete with all materials and labour necessary for a complete installation.

This specification shall be read in conjunction with the General Conditions of Contract, the Drawings issued to date and any others which may become necessary from time to time at the discretion of the Engineer in charge, and also with the Schedule of Prices, which all together form the Contract Documents.

The work shall be completed by the contractor to the full satisfaction of the Engineer in charge and the contractor shall be responsible for the satisfactory performance of the service in accordance with the spirit of the design and specifications.

The contractor shall prepare such installation diagrams, wiring drawings and schematics as may be necessary in the Engineer's opinion. These shall be submitted to the engineer for approval before execution of the work.

The contractor shall keep such records as necessary, in order to be able to complete the as-fitted drawings upon completion of the works.

The whole works shall be scheduled by the main contractor on site by consulting the engineer and client’s requirements. The contractor is responsible for preparing an overall works programme which shall require the approval of the engineer and client. The contractor shall bind himself to co-ordinate the programme of works with the works of other contractors.

The contractor is to submit technical literature covering all key components of the system being proposed. The technical submittal by itself does not confirm or otherwise that any change in specification has been accepted. All changes from the specifications have to be accepted in writing by the Engineers and Client.

## WORKMANSHIP

THE WORKS SHALL COMPLY WITH THE LATEST EDITION OF THE REGULATIONS OF THE BRITISH INSTITUTION OF ELECTRICAL ENGINEERS BS7671, including all amendments to date, and the MRA / ENEMALTA ELECTRICITY SUPPLY REGULATIONS, Codes of Practice, and normal safety regulations and to the satisfaction of the Engineer.

All workmanship shall be of best quality and in accordance with the above and best industry practices.

The Contractor shall guarantee that spare parts for any equipment supplied are obtainable in Malta. All outdoor parts shall be fit for purpose and fit for use in a highly saline environment.

The electricity supply at terminals shall be 3-Phase 4 wire, 400/230 Volts, 50 cycles earthed neutral.

### Installations

The installation shall be carried out in heavy gauge PVC conduit with white plastic wiring accessories that shall be of the LSZH type. Heavy gauge galvanised trunking manufactured to high standards shall be used as indicated in drawings. All these shall conform to BS EN 50085: 2005 (trunking) and BS EN 61386: 2008 (conduit).

All conduit and fittings shall be installed surface mounted. The contractor shall be required to phase his work with that of the structural and other contractors to ensure timely insertion of conduits, etc.

All conduits shall be securely fixed to the base material by an approved method and at not more than 1.5 m spacing, unless otherwise allowed by the Engineer.

Conduit boxes carrying accessories shall be independently fixed.

All draw-in boxes shall be easily accessible for wiring and shall be spaced so that there are not more than two 90 deg. solid bends between two boxes or more than 10 m run between them.

A separate Earth Conductor shall be used inside the conduit for Earthing of fittings, accessories and sockets.

All conduits shall be complete and thoroughly swabbed before draw-in of wires and cables.

The smallest size of conduit allowed shall be 20mm. Conduit shall be sized according to the quantity and size of cables being carried through. Standard accessories shall be used with conduit to terminate at boxes, distribution boards, switchgear, outlets etc., in order to give a completely closed and mechanically secure system.

All conduit and trunking routes shall be approved by the Engineer prior to taking works in hand.

### Builder's Work

The tenderer is to allow in the rates quoted, for all chasing, holes in RC or structural members, (all holes shall be made only under approval of the Engineer in charge and by means of circular diamond tipped tools), pipe sleeves (made to approval) etc. necessary for the proper execution of the works. The architect in charge shall approve all structural openings before taking the works in hand. The contractor shall also be responsible for the backfilling of all holes with Sand / Cement mortar for all openings in walls / structures done by himself. Non-flammable expandable foam of the proper rating and quality as approved by the engineer shall be acceptable for the filling of small holes.

The contractor shall not be responsible for the filling of all chases used for conduit and plumbing pipes in bathrooms. The contractor shall however be responsible for the plastering in place of all electrical conduit boxes and plumbing terminations. The contractor shall ensure that all electrical boxes are perfectly horizontal and in the correct position.

### Wiring

The installation shall be wired with cables having conductors not less than 1.5 sq. mm. Single strand conductors shall not be allowed.

With the exception of final sub-circuits, all cable terminations shall be of the soldered or crimped socket type terminal. Ferrules shall be used to terminate multi strand cables.

Loop connections shall only be made at the terminals of accessories or fittings. No joints in cables shall be made except with the written authority of the Engineer.

The number of cables in any conduit shall conform to the limit set by the above-mentioned IET Regulations.

All cables shall be colour coded throughout for identification: Brown, Grey, Black for the Phase conductors, Blue for Neutral, and Green/Yellow for Earth.

The contractor shall terminate the wiring in the fitting, accessory and/or equipment as specified in the drawings, etc.

Cables for individual circuits inside trunking shall be grouped together and marked with circuit number at terminations.

All cables including single cores, armoured cables and control cabling shall be of the Low Smoke and Zero Halogen type.

### Earthing

All Earthing installation shall be carried out in accordance with the IET Wiring Regulations BS7671.

The main Earth conductor shall be earthed with the Earth Mat and if supplied, with the Earth termination supplied by Enemalta. The maximum earth loop impedance of the earth mat shall be 0.10 Ohms.

Separate Earth conductor shall be passed from all conduit and trunking and all fittings for the earth connections of socket outlets, equipment etc.

All trunking is to be separately earthed and earth clips shall be used to bridge different sections of the trunking.

### Positioning

All fixture items shall be positioned as per drawings or as instructed by the Engineer.

### Markings

All switchgear and distribution boards shall be permanently marked with the voltage and current rating.

Labels indicating the services controlled by the switchgear and distribution boards shall be prepared and fixed on the outside of the appliances as directed.

In addition to the above, each distribution board shall have a list of all the equipment names and locations supplied.

### Origin of Installation

The installation shall originate from the Enemalta Sub-Station as indicated in the electrical schematic diagram.

### Uniformity

All materials used under this contract shall be of uniform design throughout.

The Engineer is to be made aware should the need arise to change material/equipment from that already approved to a material considered as an equivalent by the contractor.

### Testing

The contractor shall provide all the necessary labour and testing instruments for the tests prescribed in the above-mentioned regulations. Approval of works shall only be granted following satisfactory passing of these tests.

The test results shall be recorded in triplicate and signed by the contractor's Engineer and shall be handed over to the Engineer in charge.

### Deviations

Any deviations shall be regulated by the General Conditions of Contract.

### Measurement

The works shall be measured as specified in the Bill of Quantities and certified by the Engineer in charge.

### General Conditions

The General Conditions of Contract shall apply in so far as they are not inconsistent with the above.

## MATERIALS SPECIFICATIONS ~ Electrical Installation

### General

All materials to be used in this project are subject to approval by the Engineer in charge, upon presentation of the relevant technical literature and samples.

### Main / essential Switch Board and Main Switch

The Main Switch Board shall be of the wall mounted unit FORM 2b type, with cable entry from top and bottom, complying with BS/EN 61439. The MCCBs shall comply with BS/EN 60947-1, the indicating instruments with BS/EN 89, the current transformers with BS/EN 61869-2 (with an accuracy class rating of 0.5) and the indicating lamps with BS/EN 4099. The enclosure shall have an IP45 protection.

The Switch Boards shall comprise heavy duty incoming Moulded Case Circuit Breaker Units connected via busbars to a number of heavy-duty Moulded Case Circuit Breaker Units controlling the various outgoing circuits as indicated in the schematic drawings. All connections from the incoming Circuit Breaker to busbar Chamber and from the latter to the outgoing units, shall be done solely in copper busbars. Busbars with bolted joints are to be tin plated and busbars with plug-in joints are to be silver plated. Phase busbars are to be fully rated throughout the length of the main switchboard with the neutral busbars half or full rated. A copper earth busbar shall run along the length of the main switchboard. Earth continuity shall be provided to link the main structure together with all devices.

Small wiring in PVC flexible cable, minimum 2.5 sq. mm, shall be bunched and cleated or run in PVC duct.

Engraved plastic circuit labels shall be provided for all devices. Suitable warning labels, complying with Health and Safety requirements, shall also be provided on all covers and doors. Furthermore, a main label in accordance with BS/EN 61439, giving details of voltage rating, current rating, class of equipment, fault rating and serial number shall be provided.

The Main Switch Board shall comprise the following:

* 1 No. 200 Amp MCCB’s as indicated in the schematic.
* Busbar Chamber 200 Amps. TPN. Copper bus bars are to be full rated throughout.
* All MCCB’s shall be of the 4-pole type
* Motorized/ Non-Motorized Outgoing MCCB’s as per drawing
* The board shall be rated at 65kA.

All the switchgear shall be subjected to full function and load tests at the manufacturers’ premises and a full test certificate shall be supplied together with the Panel. These tests are to be witnessed and certified at the expense of the contractor by the Engineer or by a Certification Authority as acceptable to the Engineer

### Moulded Case Circuit Breakers

Moulded Case Circuit Breakers shall comply to BS EN 60947. Each pole of the MCCB shall provide overcurrent protection by having inverse time and instantaneous tripping characteristics, and where applicable, be current limiting. The MCCBs shall have electronic type (settable) settings / controls such that all readings as detailed above for the multifunction meter can be obtained directly from the breaker without the need of adding CTs etc. The MCCBs shall be operated by a toggle type handle and shall have a quick-make, quick-break, over-centre switching mechanism that is mechanically trip free from the handle. Tripping due to overcurrent or short circuits shall be clearly indicated by the position of the handle. The ON and OFF positions shall be clearly marked on the cover of the MCCB, providing positive indication of the circuit breaker contact position. An easily accessible push-to-trip button shall be provided on the cover of the MCCB. Circuit Breakers shall be completely enclosed in a high strength glass-polyester case. Ampere ratings shall be clearly visible from the front of the circuit breaker. Contacts shall be non-welding silver alloy. It shall have the following minimum breaking capacity:

35kA on Main Boards

25kA on Sub-MCCB Panels

16kA on TPN DBs

All MCCB panel boards shall have circuit breakers of the bolted type. Plug in breakers or breakers installed on plug-in cradles shall not be acceptable.

### Miniature Circuit Breakers

Miniature Circuit Breakers shall provide overcurrent and short circuit protection and shall comply with BS EN 60898 (IEC 898) and BS EN 60947. The MCBs shall be capable of dealing with fault currents of 6KA for MCBs up to 30Amp rating and 10KA for higher rated MCBs. They shall have a number of poles as indicated on the schematic. They shall be easily mounted on DIN rail. The Voltage rating shall be 230/400 V, 50 Hz. The input terminals shall be suitable for 25 sq. mm cable and the output terminals for 16 sq. mm cable.

### RCBOs

RCBOs shall have the same specification, where applicable for MCBs, shall be of the single pole type except where otherwise indicated and shall have differential current protection apart from over current protection to the sensitivity as indicated on the drawings and shall comply to BS EN 61009.

### MCB/RCD/RCBO Selection

The MCB / RCD / RCBO devices in use shall be suitable for the load on the circuit it is protecting as indicated below:

MCB Types B, C & D are recognised within BS 7671 and shall be employed as follows:

* ***Type B*** devices are generally suitable for domestic applications. They shall be used in light commercial applications where switching surges are low or non-existent.
* ***Type C*** devices should be used for commercial and industrial applications where some degree of electrical inrush is expected.
* ***Type D*** devices shall be used in industrial use where high inrush currents may be expected. Examples include large battery charging systems, motors, transformers, X-ray machines and some types of lighting.

|  |  |  |  |
| --- | --- | --- | --- |
| |  | | --- | | RCD | | |  | | --- | | Types of Load | |
|  |  |
| |  | | --- | | Type AC | | |  | | --- | | **Resistive, capacitive, inductive loads** Immersion heater, oven / hob with resistive heating elements, electric shower, tungsten / halogen lighting | |
|  |  |
| |  | | --- | | Type A | | |  | | --- | | **Single phase with electronic components** Single phase inverters, class 1 IT & multimedia equipment, power supplies for class 2 equipment, appliances such as washing machines, lighting controls, induction hobs & EV charging | |
|  |  |
| |  | | --- | | Type F | | |  | | --- | | **Frequency controlled equipment** Appliances containing synchronous motors, some class 1 power tools, some air conditioning controllers using variable frequency speed drives | |
|  |  |
| |  | | --- | | Type B | | |  | | --- | | **Three phase electronic equipment** Inverters for speed control, ups, EV charging where DC fault current is >6mA, PV | |

### Glands

Glands for cables shall be heavy duty indoor /outdoor type, in brass or gunmetal with suitable armour clamps and earthing provision.

### Distribution Boxes

All distribution boards shall be TPN and of the specified rating and shall have sheet steel construction with hinged doors. They shall be suited to take the cables specified and the necessary conduits. Miniature Circuit Breakers are to be fitted to all boards, arranged so as to facilitate wiring. RCBOs shall be used where indicated.

The boards shall allow for the positive isolation of the final sub-circuits. The MCB's shall be of the screwed contact on busbar type. All distribution boards with MCB’s shall be rated for a fault current of at least 35kA at 415V for 1 sec.

Before ordering the equipment and switchgear, the contractor is to check with the Engineer as to whether flush or surface mounting is to be used. The operating characteristics of the boards shall be such that the breaker will operate after not less than two minutes with sustained 25% overload. Tripping shall also occur in less than half minute in case of 200% overload, and in less than one second with 800% overload. Operation shall be of the flip-on type.

The distribution shall have factory prepared punch-outs for both the main incomer isolator as well as the RCD’s. Distribution boards with punch out effected locally shall not be acceptable. RCDs shall comply with BS EN 61008.

Where applicable, the distribution box shall be supplied c/w contactor extension box as well as all contactors as indicated in the drawings.

All distribution boards located outdoors shall have an IP65 protection rating. The enclosure shall be constructed of GRP or fibre glass enclosure, or SS316L. steel enclosure shall not be acceptable.

### Conduit and Fittings

Conduit and outlet fittings, etc., shall be as specified above and subject to approval of samples, which shall be submitted on request.

### Over/Under Voltage Protection Devices

#### General

Electrical over- and under- voltage devices shall be installed at the point of cable entry to the building to form part of a complete protected system. This refers to entry from grid systems.

#### Installation

The unit shall be installed in accordance with the manufacturer’s printed instruction to maintain warranty. All local Electrical Supply regulations (ESR) shall be adhered to and observed. The manufacturer shall also supply a warranty of at least 2 years.

#### Main Characteristics

The voltage monitoring/sensing relay shall be of the self-powering type and shall operate with a rated supply voltage of 230 V ac 50Hz output with contacts rated at 250 V. The voltage to be monitored shall be the RMS Voltage. The sensing device together with a suitably fully rated contactor shall offer both over and under voltage monitoring, open- or closed-circuit operating principle, which shall automatically restore power when voltage is within the set parameters. The hysteresis shall be adjustable within a range of 3 to 30 % of the threshold value. The tripping delay and the start-up delay shall be adjustable over a range of instantaneous to 30 s. The device shall be equipped with status indicator LED lights to indicate the fault/operating state of the relay. A sealable transparent cover for protection against unauthorized changes shall be supplied with the device.

The repeat accuracy of the device shall be less than 1% unaffected over the operating temperature -20 to 60 °C. The contactor shall be able to switch the full load of the panel at its rated capacity.

In situations where such a device is required to be used on a TPN supply, the device shall be suitable to function and operate with a supply voltage of 400V, and contactor suitably rated as per current rating of the main circuit breaker. The voltage sensing device in such cases shall be a separate unit, using the suitably rated contactor to provide its isolating function. The device shall conform to BS EN 60255-1 and BS EN 50178.

### Cable Types

All cables laid in ground shall be protected using a rodent inhibiting jacket or coating.

XLPE/ SWA/ LSZH Cable

Armoured cables are to be with shaped or round copper conductors to BS EN 60228 or equivalent and XLPE insulated to BS 7655 or equivalent, with LSZH bedding to BS 7655 or equivalent, single wire armoured and LSZH sheathed overall complying with BS 6724 or equivalent.

LSZH Cable

The LSZH cable shall consist of high conductivity stranded copper wires insulated with LSZH 230/400 V type. Copper conductor shall be compliant with BS EN 60228. Insulation shall be compliant with BS EN 50363. The cable is to be overall compliant with BS EN 50525-3-41. (Cable type H07Z-K.)

XLPE/ LSZH Cable

Cable shall consist of shaped or round copper multiple conductors, XLPE insulation rated at 90°C, and LSZH outer-sheathed overall complying with BS EN 50525-3-11. Insulation and Sheath shall be compliant with BS EN 50363.

(XGB-F2 for conductors larger than 4mm2)

### Contactors

Contactors shall be capable of switching a three-phase supply four wire (or as indicated in thedrawings), and shall be rated to handle the required indicated load.

These shall be of the solid-state type.

All contactors shall be enclosed in a sheet steel dust proof case.

### Time Switches

Time switches shall be of the electronic type, providing adjustable switching periods at any time of the day and for a minimum of 20 changes of operation in every twenty-four hours, and capable of switching an inductive load of 15A continuous, with a current breaking capacity of 30A. They shall have a 100-hour backup in case of power failure.

### Ceiling Roses

All ceiling roses shall comply with BS 67 and shall be suitable for fixing to standard conduit, round-terminal boxes. They shall have the facility for fixing 3/4 in. connections, including Earth. They shall be of white moulded plastic.

### Switched Socket Outlets

They shall be suitable for flush mounting, unless otherwise instructed and shall be white moulded plastic. Samples shall be presented at time of tendering for approval.

These shall be of three different types:

1. 13 Amp 2P+E switched socket outlet, shuttered and shall be in accordance with BS 1363. (White Socket Outlets with Red Rockers are to be used on circuits powered by UPS)

These shall be surface mounted:

1. Industrial type socket outlets of the indicated current rating shall be in heavy duty plastic and shall be watertight to IP67. These shall be manufactured to IEC 60309-1,-2.

### Watertight socket outlets

These shall be installed externally as indicated in the drawings. They shall be of robust, weatherproof construction and rated as per drawings. The socket outlets shall be c/w spring-loaded polycarbonate lids. The s/o shall be such that they shall retain their water tightness even when being used.

### Fused Spurs

These shall be suitable for connecting a fixed appliance to a ring main socket outlet circuit as prescribed in latest IET Regulations.

The unit shall consist of rectangular metal box complete with metal overlapping plates and removable fuse carrier, fitted with cartridge type fuses.

They shall be of the switch type and of approved finish.

### Flex Outlets

The flex outlets shall be supplied with three pairs of terminals suitable for 2 x 2.5 sq. mm conductors.

### Tumbler Switches

These shall be of the "quick make and break" type, suitable for AC operation. They shall be wired "on" when the knob is down; 5 Amp type and 15 Amp type to BS 5733.

### Galvanised trunking / Cable tray

The galvanised trunking shall be manufactured, from hot dipped galvanised sheet steel complying with BS EN 10346, and manufactured to BS EN 50085. The thickness of the sheet shall be such that there is no sagging of the trunking with the load of the cables. If in the opinion of the Engineer the trunking deforms with the weight of the cable the contractor shall be requested to remove the said trunking and replace it. The trunking shall be supplied complete with a clip on cover of the same material quality and thickness of the main trunking. No self-tapping screws shall be used to hold the cover but if necessary plastic ties shall be used.

Note that all changes in direction are to be made using factory made long sweep fittings. No locally manufactured elbows, tees etc. shall be accepted.

Suitable cable trays shall be installed to carry the supply cables to the various Distribution Boards.

All installations are to be complete with all necessary earth clips for a complete installation.

### Cable Basket

The galvanised cable basket shall be manufactured from hot dipped galvanised steel complying with BS EN 61537 and shall be supplied complete with all necessary side unions or clamp sets. The thickness of the rods shall be such that there is no sagging of the basket with the load of the cables. If in the opinion of the Engineer, the basket deforms with the weight of the cable the contractor shall be requested to remove the said basket and replace it.

Note that all changes in direction are to be made using factory made long sweep fittings. No locally manufactured elbows, tees etc. shall be accepted.

All installations are to be complete with all necessary earth clips for a complete installation.

### ELV Systems

The ELV systems are to be installed through a distribution of PVC sleeves and wired by the contractor as indicated in the drawings. The exact location of points shall be as indicated in the drawings and by the Engineer on site.

### Brackets

All cable trays, cable trunking and the like, shall be supported at spacing of not more than 1.5 meters apart and at all changes in direction. Hangers, brackets and supports shall be of the pre-galvanised type with factory made fittings. No local manufactured brackets cut and welded on site shall be accepted.

### IP65 Connection boxes

These boxes shall be used externally for looping of the armoured cable feeding the low - level lighting and any other lighting or general power circuits. These shall be of polycarbonate construction with an IP65 rating and shall be complete with a DIN rail and grip connectors.

### Presence Detectors

These shall be passive dual technology type sensors incorporating both infrared technology as well as microwave detection technology to minimize false detection. They shall automatically select optimal setting for each space and have an integral light level sensor. These shall be wall mounted or ceiling mounted as indicated in the drawings.

Wall mounted sensors shall have a 120 degree field of view and a minimum range of 10 metres (IR); 15metres (Microwave).

Ceiling mounted sensors shall have a 360 degree field of view and a minimum range of 15 metres.

### Lighting Luminaires

General

In general, all fittings are to be supplied with lamps, control gear, PF capacitor etc. as may be required for the complete functioning of the light fitting. Light fittings with the same designation letter shall be aesthetically similar. All Light fittings are to be approved by client prior to installation.

The lamps shall have a colour temperature of 4000K unless otherwise indicated.

All emergency lighting shall have factory fitted batteries and controllers. Fittings converted to emergency lights locally shall not be acceptable.

These light fittings are to be installed in a saline environment, hence, all light fittings being used shall have a full stainless steel 316L or polycarbonate body and accessories. No aluminium fittings shall be acceptable. All fittings shall carry a minimum of five - year warranty.

The images of the fittings shown are for indicative purposes only

|  |  |
| --- | --- |
| Type A1 – Ceiling Mounted LED Tube 30W Fittings  These shall be installed within the General areas, labs, and the outbuildings as indicated in the Drawings. These shall be LED type fittings suitable to be mounted onto the ceiling. These shall have a polycarbonate or stainless-steel body construction and accessories and shall have a polycarbonate screen.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W. The optics of the fitting shall match the fitting spacing and mounting height to avoid darker areas.  The fitting shall be CE Marked and have a minimum warranty of 5 years. | ip65-noncosssirve-800x800 |
| Type A2 – Ceiling Mounted LED Tube 30W Fittings c/w power pack  They shall be similar to light fittings type A1 but shall be supplied c/w a power pack suitable for three hours of operation.  These fittings shall operate normally and shall only be powered through the power pack to provide emergency lighting in case of power failure.  It shall also be complete with LED’s showing charge state of the batteries. The batteries shall be recharged during normal operation. These fittings shall carry a 5-year warranty. | ip65-noncosssirve-800x800 |
| Type A3 – Ceiling Mounted LED Tube 20W Fittings  These shall be installed within the Food Store and Equipment Store as indicated in the Drawings. These shall be LED type fittings suitable to be mounted onto the ceiling. These shall have a polycarbonate or stainless-steel body construction and accessories and shall have a polycarbonate screen.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W. The optics of the fitting shall match the fitting spacing and mounting height to avoid darker areas.  The fitting shall be CE Marked and have a minimum warranty of 5 years. | ip65-noncosssirve-800x800 |
| Type A4 – Ceiling Mounted LED Tube 20W Fittings c/w power pack  They shall be similar to light fittings type A3 but shall be supplied c/w a power pack suitable for three hours of operation.  These fittings shall operate normally and shall only be powered through the power pack to provide emergency lighting in case of power failure.  It shall also be complete with LED’s showing charge state of the batteries. The batteries shall be recharged during normal operation. These fittings shall carry a 5-year warranty. | ip65-noncosssirve-800x800 |
| Type B2 – 15W Surface mounted Downlighters (IP44)  They shall be similar to light fittings type B1 but shall be supplied c/w a power pack suitable for three hours of operation.  These fittings shall operate normally and shall only be powered through the power pack to provide emergency lighting in case of power failure.  It shall also be complete with LED’s showing charge state of the batteries. The batteries shall be recharged during normal operation. These fittings shall carry a 5-year warranty. | LED Slimline Downlight Surface Mounted Furniture 4,5W 360Lm Driver Dimmable |
| Type C1 – IP65 Wall Mounted Lights 10W  These shall be installed in the turtle tank area between the platform and the viewing window as indicated in the Drawings. These shall be LED type fittings suitable to be surface mounted onto the Wall. These fittings shall have a Stainless Steel 316L construction with polycarbonate screen and shall be such that they do not protrude substantially from the wall.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W.  The fitting shall be CE Marked and have a minimum warranty of 5 years. They shall have an IP65 rating. | 2020 LED Wall Pack Light 12W 20W 30W 35W 50W 80W 100W 120W Outdoor Wall  Mount LED Garden Lamp AC90 277V From Ledbaby, $60.92 | DHgate.Com |
| Type D1 – Ceiling Mounted Downlights 15W  These shall be installed within the Reception area and meeting room as indicated in the Drawings. These shall be LED type fittings suitable for surface mounting onto the ceiling.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W. The fittings shall be finished complete with a polycarbonate screen.  The fitting shall be CE Marked and have a minimum warranty of 5 years. They shall have an IP44 rating. | Ikon S Surface Circular Downlight Product Photograph - Ceiling, HD Png  Download , Transparent Png Image - PNGitem |
| Type D2 – Ceiling Mounted Downlights 15W  c/w power pack  They shall be similar to light fittings type D1 but shall be supplied c/w a power pack suitable for three hours of operation.  These fittings shall operate normally and shall only be powered through the power pack to provide emergency lighting in case of power failure.  It shall also be complete with LED’s showing charge state of the batteries. The batteries shall be recharged during normal operation. These fittings shall carry a 5-year warranty. | Ikon S Surface Circular Downlight Product Photograph - Ceiling, HD Png  Download , Transparent Png Image - PNGitem |
| Type E1: Maintained Emergency lights c/w Exit Signage  These shall be switched on at all times and upon failure of electrical supply shall give illumination for a minimum period of three hours. They shall be supplied complete with dry rechargeable battery backup, charger, an indication when electrical supply is present, LED type; polycarbonate case. They shall also be complete with LED’s showing charge state of the batteries. If appropriate these emergency lights shall be complete with visual indications (luminous signs) giving directions to enable the occupants to leave the premises in case of emergency. | A picture containing text, sign  Description automatically generated |
| Type E2: Non-Maintained Emergency lights  These shall only switch on upon failure of electrical supply shall give illumination for a minimum period of three hours. They shall be supplied complete with dry rechargeable battery backup, charger, an indication when electrical supply is present, LED type; polycarbonate case. They shall also be complete with LED’s showing charge state of the batteries. | Eterna Emergency Light Fitting, Non-Maintained LED Bulkhead For Halls,  Warehouse 5013845043038 | eBay |
| Type F1: 600 x 600 mm Panel Ceiling Mounted LED 30W  These shall be installed within the Offices as indicated in the Drawings. These shall be panel LED type fittings suitable for surface mounting onto the ceiling.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W. The fittings shall have a polycarbonate construction and shall be finished complete with a polycarbonate screen.  The fitting shall be CE Marked and have a minimum warranty of 5 years. They shall have an IP44 rating. | Panel 600-4 Premium :: LED Leuchten - LED Lights :: PROLED MBNLED |
| Type F2 – 600 x 600 mm Panel Ceiling Mounted LED 30W c/w power pack  They shall be similar to light fittings type F1 but shall be supplied c/w a power pack suitable for three hours of operation.  These fittings shall operate normally and shall only be powered through the power pack to provide emergency lighting in case of power failure.  It shall also be complete with LED’s showing charge state of the batteries. The batteries shall be recharged during normal operation. These fittings shall carry a 5-year warranty. | Panel 600-4 Premium :: LED Leuchten - LED Lights :: PROLED MBNLED |
| Type G1 – IP65 High Level Wall Mounted Downlighter LED 10W Fittings  These shall be installed externally at the perimeter of the buildings as indicated in the Drawings. These shall be LED type fittings suitable to be surface mounted onto the Wall. These fittings shall have a Stainless Steel 316L construction with polycarbonate screen and shall be such that they do not protrude substantially from the wall.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W.  The fitting shall be CE Marked and have a minimum warranty of 5 years. They shall have an IP65 rating. | Image result for wall mounted led downlights |
| Type H1 – Utility Light LED 10W Fittings  These shall be installed beneath the viewing platform overlooking the turtle tanks as indicated in the Drawings. These shall be LED type fittings suitable to be surface mounted onto the platform structure. These fittings shall have a Stainless Steel 316L construction with polycarbonate screen and shall be such that they do not protrude substantially from the platform.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W.  The fitting shall be CE Marked and have a minimum warranty of 5 years. They shall have an IP65 rating. | Clean Room Bulkhead Light Fitting at Best Price - Clean Room Bulkhead Light  Fitting by FCG Hi Tech Pvt Ltd in Mumbai - Justdial |
| Type I1 – Low Level Wall Mounted Light Fitting 5W  These shall be installed externally in the aviary area at low level around the perimeter as indicated in the Drawings. These shall be LED type fittings suitable to be surface mounted onto the Wall. These fittings shall have a Stainless Steel 316L construction with polycarbonate screen and shall be such that they do not protrude substantially from the wall.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W.  The fitting shall be CE Marked and have a minimum warranty of 5 years. They shall have an IP65 rating. | Brick & Low Level Lights | Lighting Styles |
| Type J1 – High Level Aviary Mounted Light Fitting LED 15W  These shall be installed within the aviary areas as indicated in the Drawings. These shall be LED type fittings suitable to be mounted at high level onto the aviary enclosures. These shall have a polycarbonate or stainless-steel 316L body construction and accessories and shall have a polycarbonate screen.  The electronic driver must be capable of withstanding an input voltage of 255V. They shall be flux insensitive to mains voltage variations, they shall have a power factor >0.9, shall be such that lamps shall ignite without flickering. They shall have an illuminating colour temperature of 4000K and having a luminous efficacy of at least 85 lm/W. The optics of the fitting shall match the fitting spacing and mounting height to avoid darker areas.  The fitting shall be CE Marked and have a minimum warranty of 5 years. | FI88 SERIES IP65 T5 / T8 LED TUBES FIXTURE |
| Type K1 – IP65 Flood Lights Pole Mounted Light Fittings LED 50W  The floodlights shall serve as perimeter security lighting installed on poles as indicated in the drawings and shall be switched on upon motion sensing or remotely from the security desk in the reception area. The price of the Light fitting shall be inclusive of all necessary cabling and control equipment for remote operation.  Floodlight fittings shall have a vandal proof polycarbonate or stainless-steel 316L and shall require no periodic maintenance and is not subject to corrosion. The fitting shall not require any painting and shall be such that there shall be no galvanic corrosion between fitting and mast. The visor shall be hinged for ease at re-lamping and secured to the lantern body by means of stainless-steel 316L hinges and catches and shall have purposely designed brackets for a secure installation.  The Driver shall be built in the housing itself and shall be capable to withstand an input voltage of 255V. The fitting shall be CE Marked and have a minimum warranty of 5 years. | Cool White 50W LED Flood Light with MeanWell Driver |
| Type K2 – IP65 Infra-Red Flood Lights Pole Mounted Light Fittings 50W  The floodlights shall serve as perimeter security lighting installed on poles to illuminate the Aviary area as indicated in the drawings and shall be switched on upon motion sensing or remotely from the security desk in the reception area. The price of the Light fitting shall be inclusive of all necessary cabling and control equipment for remote operation. This light fitting is to provide night vision surveillance, with invisible lighting so as not to disturb the birds, located in the aviary upon switching on of the floodlights.  The light fitting shall be of the ultra-covert type, i.e. there shall be no visible red dots when the fitting is switched on. The fitting shall be IP65 rated and shall be suitable for a saline environment. The Infra-Red floodlight shall have a range of 60m.  The Driver shall be built in the housing itself and shall be capable to withstand an input voltage of 255V. For fittings operating with 12VDC input, all the necessary transformers and ancillary equipment for a complete system shall be supplied and costed as part of the fitting itself.  The fitting shall be CE Marked and have a minimum warranty of 5 years. | Buying Guide | Hidden Vision Infrared Illuminator Wide Angle 12-LEDs IR  Lig... |

## MATERIALS SPECIFICATION - UPS SYSTEM

The following UPSs shall be installed in the Reception Area to cater for the CCTV System, Security System and Fire Alarm System as per drawings and specifications below.

|  |  |  |
| --- | --- | --- |
| Unit Rating | Autonomy | Quantity |
| 2kVa | 30mins | 1 |

The batteries shall be housed in a separate cabinet.

### Components

The UPS shall consist of the following major components:

* rectifier / battery charger
* static transistor inverter
* input and output filters
* input, battery, reserve, output and by-pass switches
* harmonic cancelling transformer
* Electronic static switch and reserve supply
* Output Cards to link to BMS system

### Microprocessor control and diagnostics

Operation and control of the UPS shall be provided through the use of microprocessor-controlled logic.

Indications, measurement, and alarms shall be shown on a liquid crystal or LED display with mimic diagram.

The UPS shall have an output in order to be able to interface the unit to the central BMS

### Essential features

1. Display status of alarms with audible alarm mute and test push-button.
2. The UPS’s shall include an SNMP card through an RJ45 Ethernet jack. Software complete with all required licenses is to be supplied. Parameters reviewed via SNMP must at least include output voltage, current and frequency; current UPS load either in VA or as a percentage of the total output capacity; battery charge level, battery output current and battery voltage. Battery fault alarm shall also be displayed
3. Overload trip circuit breakers
4. Input and output RFI suppression filter(s) class A of the EN 62040-2 (EN 50091-2) Standard.
5. Battery fault alarm (The UPS shall be complete with a remote fault alarm connection such that this can be interfaced to the BMS when this is connected)
6. Minimum protection to IP 20.
7. The batteries shall have the same warranty period as the UPS.

### Modes of operation

The UPS shall be designed to operate as an on-line reserve transfer system in the following modes.

#### Normal

The inverter continuously supplies the load. The rectifier / battery charger derives power from the input AC source and supplies DC power to the inverter whilst simultaneously maintaining the battery in a fully charged condition. The static switch monitors and ensures the inverter tracks the reserve supply frequency. This means any automatic transfer to the reserve supply due to an overload etc. is frequency synchronised and does not cause an interruption of supply to the computer load.

It is fundamentally important that frequency synchronisation process, shall allow for the inevitable changes in supply frequency caused by transient fluctuations in frequency caused by load changes when the UPS is supplied from the standby generator.

#### Overload

In the event of an inverter overload, manual stop or failure, the static switch will automatically transfer the load to the reserve supply without interruption.

#### Emergency

Upon failure or reduction (-15%) of the input AC power the critical load is supplied, without any switching by the inverter drawing its power from the associated battery.

The UPS shall have an autonomy on batteries of a minimum of 10mins at full load. The UPS shall be such that if required, additional batteries to augment the autonomy can be added at a later date.

#### Recharge

Upon restoration of the commercial AC power, the rectifier / charger power the inverter and simultaneously recharge the battery. This shall be an automatic function and shall cause no interruption to the computer load.

#### Battery servicing

If the battery is taken out of service for maintenance, it shall be disconnected from the rectifier charger and inverter by means of a switch. The UPS shall continue to function and meet all the performance criteria specified except for the standby period.

#### Automatic Restart

The UPS shall be configured such that it shall automatically restart and resume supplying power to the critical load on inverter upon restoration of utility AC power, after a utility AC power outage and complete battery discharge.

#### Bypass

The bypass shall provide an alternate path for power to the critical load that shall be capable of operating as follows:

A. Automatic - In the event of an internal failure or should the inverter overload capacity be exceeded; all UPS modules shall perform an automatic transfer of the critical AC load from the inverter to the bypass source.

B. Eco-Mode – The UPS module(s) shall be able to operate in Eco-Mode when the power quality parameters of the by-pass source are within the permissible tolerances. The UPS system shall automatically transfer the load to normal mode if the by-pass source goes out of permissible tolerances. Transfer in both directions shall take place very rapidly (< 5ms) and shall not affect the supplied load. The UPS control system shall be such that the user may opt to disable this function.

C. Manual - Should the UPS module(s) need to be taken out of service for limited maintenance or repair, manual activation of the bypass shall cause an immediate transfer of the critical AC load from the inverter to the bypass source

### General requirements

#### Applicable standards

The UPS is to be manufactured according to the following standards

IEC 204.1 / EN 60204 -31 (CEI 44-5) Electrical Equipment of industrial machines

BS EN 60439 part 1 & 2/IEC 439.2 (CEI 17-13) Low voltage switchgear assemblies

IEC 146 (CEI 22-2) / BS EN 5038:2003 Uninterruptible power supplies

IEC 529 / EN 60529 (CEI 70-1) Protection enclosure degree

BS EN 3182 / IEC 364 /Building electrical installation

BS EN 5645 / IEC 76 TBA (CEI 14-4, CEI 64-8, CEI 20-22)

EN 62040 –1-1/2003 / EN 60950-1:2001/A11:2004 – safety standards

EN 62040-3:2001 – Performance standard

#### Components

All active electronic devices shall be solid state and shall not exceed manufacturer’s recommended operating parameters for maximum reliability.

#### Grounding

The UPS output AC neutral shall be electrically isolated from the UPS chassis and earth.

The UPS chassis and ground systems shall be connected together and to a common ground point.

#### EMI suppression

Electromagnetic effects shall be minimised to ensure that computer systems or other similar electronic systems shall either adversely affect or be affected by the UPS.

The UPS shall also conform to the following where applicable:

EN 62040-2:2005 / EN 61000-3-2:2000 / EN 6100-3-3:1995-A1:2001 / EN 61000-6-2:2001 / EN 61000-6-4:2001

### Rectifier / battery charger

#### General / input

Incoming AC power shall be converted to regulated DC output by the rectifier / battery charger. Incoming AC nominal voltage shall be 415V +10%, -15%, 3 phase, 4 wire, frequency 50Hz +/-5%. The rectifier / battery charger shall be a 12 pulse, 3 phase fully controlled rectifier bridge with constant voltage / constant current characteristics.

#### Voltage regulation

The rectifier / battery charger output voltages shall not deviate by more than 1% RMS under the following conditions.

* No load to 100% variation on the UPS system
* Primary input voltage and frequency variations up to the above stated limits.

Ambient temperature variations within the specified range.

#### Power Factor

The rectifier / battery charger shall have an input power factor of 0.97 lagging minimum with nominal input voltage and in the automatic standby charge state.

#### Ripple

The rectifier / battery charger shall be provided with an output L-C filter to limit the rectifier ripple voltage to </= 2% RMS maximum in the automatic standby charge state with battery disconnected.

#### Total Harmonic Distortion

The maximum voltage THD on the input shall be </= 3%

The maximum current THD on the input shall be </= 5%

Harmonic cancelling transformers shall be installed with all UPS systems, to eliminate any harmonic effects which may result.

#### Capacity

The rectifier / battery charger shall have sufficient capacity to support a fully loaded inverter and simultaneously maintain the battery in a full charged standby condition.

After partial or complete discharge of the battery, the rectifier / battery charger powers the inverter and automatically starts recharging the battery.

The recharge cycle shall be pre-set at 12 or 24 hours.

#### Over voltage protection

The rectifier / battery charger shall be automatically turned off if the DC voltage exceeds the maximum pre-set value.

#### Automatic battery checking

The charging status of the battery shall be automatically checked and if out of pre-set limits an alarm shall be shown on the display. The alarm shall also be displayed via the SNMP card and future BMS installation

#### AC / AC efficiency in standby condition

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Load | 25 % | 50 % | 75 % | 100 % |
| Efficiency | 83 % | 87 % | 90 % | 92 % |

#### DC / AC efficiency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Load | 25 % | 50 % | 75 % | 100 % |
| Efficiency | 84 % | 89 % | 92 % | 92.5 % |

#### Batteries

The batteries shall have an autonomy as indicated above.

The batteries shall be of the Flame-retardant type, which renders the UPS suitable for installation inside a computer room.

Systems whereby the UPS battery charging circuit shall comprise of a separate battery charger and not depend on a charge voltage being derived from the UPS input rectifier shall be preferred. In this way, the battery charging voltage shall have zero AC (ripple) content.

The UPS battery system shall consist of a minimum of 2 parallel strings of multiple cells. Each individual parallel string shall have its own dedicated means of electrical protection. The UPS shall be able to function on only one string all be it at a reduced autonomy

### Transistor Inverter

#### General Input/output

The inverter shall use pulse width modulation (pwm) technology to generate three-phase sinusoidal AC power. The inverter shall operate within specification over the nominal / battery charger voltage range.

#### Output

The inverter output shall be controlled by microprocessor.

Input voltage 415V 50Hz 3 Phase and neutral 4 wire Maximum power at 0.9 power factor lagging.

#### Voltage regulation

The inverter steady state output voltage shall not deviate by more than +/- 1% in a steady state condition for input voltage variations within the quoted limits and +/- 8% for 0 to 100% load step and vice versa.

#### Frequency regulations

The inverter steady state output frequency when synchronised to reserve shall not deviate by more than +/- 1%

#### Frequency slew rate

Frequency slew rate shall be </= 1Hz per second and controlled by the microprocessor-controlled logic.

#### Frequency control

The output frequency of the inverter shall be controlled by a quartz oscillator, which can be operated as free running unit or as a slave for synchronised operation with a separate AC source. The accuracy of the frequency control shall be +/- 0.005 when free running and be controlled by the microprocessor-controlled logic.

#### Total harmonic Distortion

The inverter shall provide harmonic neutralisation and filtering to limit the THD in the output voltage to less than 2% with a linear load.

#### Voltage Transient response

The inverter transient voltage shall not exceed +/- 8% when subjected to a load application of 0 to 100%

#### Overload

The inverter shall be capable of supplying an overload of 125% for 10 minutes, 150% for 10 seconds at 0.9 power factor lagging. Short circuit current for 1 second shall be 200%

#### Voltage adjustment

The inverter shall have the option to manually adjust the output to compensate for line voltage drops within the limits.

0%, 2%, 4%, or 5% selectable

#### Inverter shut down

Upon sensing an internal failure, the inverter electronic control shall instantaneously remove the inverter from the computer load, transfer to reserve if within limits and then shut itself down.

### Inverter DC protection

The inverter shall be protected against DC over voltage and under voltage.

### Mechanical Specifications

#### Enclosure

The UPS shall be housed in a freestanding modular cabinet with removable panels as standard to IP 20.

#### Ventilation

Forced air-cooling shall be provided to ensure that all the components are operated within specification with air entry in the base and exit in the top.

#### Painted surfaces.

Painted surfaces shall be cleaned and finished with an electrostatically applied epoxide enamel of a minimum of 60 microns thickness of the manufacturer’s standard colour.

#### Front access

All alarms shall be visible from the front of the unit. The UPS shall be fork liftable.

#### Environmental conditions

The UPS shall be capable of withstanding any combination of the following environmental conditions/ it must operate without electrical or mechanical damage or degradation of operating characteristics.

|  |  |
| --- | --- |
| * Ambient temperature | 0°C to 40°C |
| * Relative humidity | up to 90% (non-condensing) for temp at 20°C |
| * Altitude | Max. Altitude 200m above sea level without derating. |
| * Audible noise | 65dBA at 1 m |

# 5.0 SPECIFICATIONS FOR THE INSTALLATION OF MECHANICAL SERVICES

The following installations shall be suitable for a saline environment. Hence, all installations shall be of polycarbonate construction or stainless steel 316L construction. Installations using equipment with aluminium construction shall not be acceptable.

## *PREAMBLE TO SPECIFICATION*

### Scope of work

The work covers the installation and connecting up, testing and commissioning of mechanical services and includes for the supply and installation of all equipment, piping and accessories.

The contractor shall:

1. Execute work in a diligent and competent manner.
2. Complete the work in its entirety, to the Engineer's satisfaction and in accordance with the design and instructions of the responsible Engineer.

### Discrepancies

Special attention has been given such that as far as possible, the drawings, specification and schedule of items, detail the whole of the requirements for this work. The tenderer shall however satisfy himself that these documents cover the complete systems, as regards materials, equipment and accessories, for the correct and proper operation of the installation as a whole.

### Extent of Works

This part of the works includes for:

1. Plumbing Installation
2. Ventilation System
3. Air Conditioning System
4. Sewerage System

All major pipelines and service type shall be identified according to BS 1710: 2014.

### Complete System

The system shall be complete and working in all respects, and shall include all necessary accessories, fittings, ancillary equipment, pipes, vents, strainers, spigots, dampers, valves, controlling equipment, insulation, drains etc., and all items not specifically mentioned according to the scope and spirit of this description.

### Protection of works

The Contractor shall protect all equipment, material and works until taken over by the client and shall remain his sole responsibility until official handing over.

### Quantities / Variations

The consultants may supply any additional drawings or directions as may be necessary for the proper execution of the work. If the work shown on any such drawings or directions is, in the opinion of the contractor, extra to that comprised in the specifications and Bills of Quantities, he shall give notice in writing to this effect before proceeding with such work; if this condition is not adhered to, the Contractor shall have no right for any additional claim at a later stage.

### Working Drawings

The Contractor shall be responsible for the preparation of all-working drawings, diagrams, schedules of materials, etc., necessary, to be submitted to the Engineer for approval before proceeding with the works.

### Alternatives

The tenderer is NOT ALLOWED TO CHANGE ANY OF THE DESIGN PARAMETERS, PIPE SIZES, and SIZES OF DUCTS ETC.

IN THIS EVENT THE TENDER SHALL NOT BE CONSIDERED AND THE TENDERER SHALL BE DISQUALIFIED.

### Drawings and Diagrams

The contractor shall prepare working drawings and such installation diagrams, wiring drawings and schematics as may be necessary in the Engineer's opinion. These shall be submitted to the engineer for approval before execution of the work.

The contractor shall keep such records as necessary, in order to be able to complete the as-fitted drawings upon completion of the works.

### Submittals

The contractor is to submit technical literature covering all key components of the system being proposed.

## WORKMANSHIP



### Regulations

All work shall be carried out in accordance with the relevant safety regulations, British Standard Code of Practices including, BS 8313 and normal trade practice and to the entire satisfaction of the Consulting Engineer.

### General Conditions

All work is to be executed according to the general workmanship specification found elsewhere, unless otherwise specified to the contrary hereunder.

All equipment is to be suitably rated for the marine environment.

### Piping Installation

Main supply pipes for the various installations shall be as follows

|  |  |
| --- | --- |
| Fresh water distribution: | High Density PPR PN10 tested to BS 6920 pipe mains.  All external runs must be shielded from exposure to UV lights using UV resistant tape (UV cover to be included in pipe rates) or specialised external type pipe used.  AND  Polybutylene to BS 7291 and tested to BS 6920 (DIN 16968 / 16969) for end of line branch off/drop for connection to fitting only  AND    PE for external runs connecting Block A to the Outbuildings. All external runs must be shielded from exposure to UV lights using UV resistant tape (UV cover to be included in pipe rates) or specialised external type pipe used. |
| Domestic Hot Water Distribution: | High Density multi-layered PPR PN10 tested to BS 6920 or equivalent of the multilayer pipe mains. |
| Refrigeration pipe work | DX Systems: Copper tubes shall conform to BS EN 12735 or equivalent. The pipe work and brazing material shall be suitable for R410A refrigerant (VRF Units) and R32 Refrigerant (Split Units). |
| Sewerage / surface water/  Condensate drain system: | UPVC PN 6  High Pressure UPVC for pumped systems  PE for rehabilitation tanks sewerage. All external runs must be shielded from exposure to UV lights using UV resistant tape (UV cover to be included in pipe rates) or specialised external type pipe used. |

All pipe/duct sizes shown shall be internal diameters.

Any pipes, brackets, hangers, steelwork and the like, shall be protected by galvanizing (pre-galvanised type). Pipes shall be finished with two-finish coats enamel paint in an approved colour so as to be colour coded. Flow direction shall be stencilled clearly on the pipe itself.

Expansion bellows/joints shall be used where long runs of pipework are required or where there are any expansion joints for the building. This shall depend on the expansion coefficient of the pipework material and shall be used as frequently as required and to manufacturer’s recommendations.

Horizontal pipes shall be supported at spacing of not more than two meters for galvanised pipes / copper pipes and 0.75m for polyethylene/polybutylene/polypropylene pipes and at all changes in direction.

Hangers and supports shall be secured with neat purposely made wrap around bolted brackets. The method and location of supports shall be as indicated by the Engineer.

Where threading is used, this shall be carried out for the total length of the joint or accessory with a good threading machine.

Any threads exposed after jointing shall be painted with a suitable rust preventor.

PTFE tape or flax fibres (for sealing metal threaded connections) with a good threading compound shall be used throughout on all threaded joints.

All distribution pipe work shall be thoroughly cleaned before any tests are carried out. Pressure test shall be applied to the piping only excluding any parts of the equipment. The test pressure shall be one and a half times the operating pressure and shall be applied for a duration of at least four hours. The tests shall be applied before any insulation is installed or pipes concealed.

Installation of hot and cold water in toilets shall be carried out using a PPR or composite pipe or PB pipe system.

No pipe work is to pass from underneath floor tiles except where specifically approved

Sizing of pipes shall be as indicated on drawings. In toilets the size of the PVC piping shall be as indicated in the drawings.

All pipe ends shall be blanked off during the works to prevent the ingress of dirt and other obstructions, which may cause blockages etc. The contractor shall take all precautions to comply with this measure. Drainpipes of rigid PVC shall be properly jointed in accordance with the manufacturer's recommendations. Adequate blank Tees shall be inserted in all drain pipework to ensure easy cleaning and rodding in case of blockages in the future.

Pipe joints shall under no circumstances be allowed in the thickness of walls, floors, etc. Pipework shall be placed in chase within walls, only where specifically instructed by the Engineer.

Sleeves shall be provided wherever pipes cross-floors or walls in the structure. When these are required to cross Reinforced Concrete members, instructions are to be sought from the Architect as to the correct placement, and size of the holes, as also to the method of procedure in drilling. PVC sleeves shall be cemented into the wall thickness and the space between the pipe and the sleeve shall be caulked with approved flexible mastic etc.

Pipework shall be fixed at approved levels after co-ordination with the Engineer as to False Ceiling heights etc. They shall be properly hung using adequate brackets, hangers, support frames etc. Provision of loops, expansion bellows, or the use of changes in direction, shall be necessary to allow for pipe movement and expansion.

Quantities of pipework and valves are as accurate as possible, but the contractor is enjoined to check the runs for himself and satisfy himself as to their correctness.

Steel pipes, which are welded, shall have flanged joints where there are change in direction or when a straight run exceeds twelve meters.

### Chrome and Sanitary Ware

Chrome finished stopcocks, taps, connectors, angle valves and all sanitary ware shall be supplied by the Client, but rates quoted shall include for the fixing by the Contractor.

### Drains

The Drains shall be in accordance with EN1329 and EN1401. Piping shall be installed inside buildings according to EN12056 and outside buildings according to EN752.

All drains in toilets shall be carried out in medium gauge PVC pipes of the following sizes:

* 40 mm for sink drains
* 50 mm for kitchen drains

Drains for air-conditioning units shall have a minimum size of 28 mm depending on the size of the A/C unit. All A/C drains are to be furnished with water traps and connected to drains as indicated in the drawings.

Drains in kitchen are to be of CPVC/copper or other approved material able to sustain high temperature water.

All drains are to be given adequate gradient and supported at a spacing not exceeding 1 m. Inspection Tees shall be used to facilitate cleaning and clearing of blockages. Drains shall connect the respective sanitary fitting to the nearest gulley trap. All vertical main drain pipes are to be air vented. All drains for the air conditioning systems to be adequately lagged in order to inhibit the formation of condensation.

### Testing and Commissioning

All testing and commissioning shall be in accordance with IHVE and BS guides for test procedures, and to the satisfaction of the Engineer.

Although testing of individual sections is allowed, in the interest of speed, the testing shall be considered carried out only when the COMPLETE installation is tested and commissioned. The contractor shall remain responsible for individually tested sections and will cover them at his own risk.

The contractor shall provide all test points, equipment and facilities to carry out the tests, both on site and at remote locations. All manufacturers' items performance data and characteristics shall be collated together with test results, for future reference and maintenance.

All equipment shall be adequately labelled and marked. Schematic pathway and riser "as built" Drawings etc., shall be prepared by the contractor and presented to the Engineer on completion.

The following tests are to be carried out during or before commissioning:

* Pipework testing - All pipework runs shall be tested, including bellows, joints, flexibles etc., and a test schedule shall be prepared by the contractor, for approval and used to clarify the tests carried out. This schedule shall be approved by the Engineer before adoption for use.
* Hydraulic testing of pipe runs - This shall be to 1.5 times working pressure for FOUR hours duration, and shall exhibit no loss of pressure, and no visible leakages on inspection. Any parts or instrumentation not designed for such pressure shall be temporarily excluded from the test.

### Method statement

The contractor shall furnish the Client / Engineer with a detailed description of the method statement to be employed in the installation of the various services. This applies both for the internal installations as well as in the supply and installation of the main plant. This method statement is to be approved by the Client / Engineer prior to the works being taken in hand.

## MATERIALS SPECIFICATION - Plumbing

### Uniformity

All materials used under this contract shall be of uniform design throughout, similar parts being interchangeable. All Main installation shall be in accordance with WSC requirements.

### Electrical Equipment

All electrical equipment forming part of the mechanical services shall be suitable for 230V/400V 50Hz electrical supply. All motors above 750W shall meet the IE3 standard (circuit breakers must cater for high in-rush currents in this case) or shall meet the IE2 standard and be equipped with a variable speed controller.

### Piping

All piping shall be as specified above and of the sizes indicated in the bills of quantities and on drawings.

### Flexible pipe connectors

Flexible pipe connectors shall be installed in order to minimise noise and transmission of vibrations from the equipment to the pipework.

Flexible pipe connectors shall be included and installed on the inlet and outlet sides of pumps. They shall be sized equal to the adjacent pipework to which they are connected and shall be deemed to be included in the cost of the pumps.

They shall be manufactured from approved materials, having flanged or screwed ends, and shall be designed to withstand the test pressures and system working temperatures without deterioration. Manufacture's data is to be submitted for approval before quantities are obtained.

### Insulation

All hot water piping and accessories shall be properly insulated and finished in a smooth, clean workmanlike manner with all joints tightly finished.

The insulation is to be so applied as to eliminate air pockets between the pipe walls and the insulation material itself.

Insulation shall be pre-formed sectional wool or rubber-type moulded section conforming to pipe diameters and having a density of 96 Kg/m3 min and a Max. K. Factor of 0.032 W/m deg C at a temperature of 25 deg C. It shall be suitable for use over an operating temperature range of between -50 and 90 deg C and shall have incombustible properties. Its specification should declare it not subject to rot, deterioration from dampness, non-corrosive and vermin inhibiting.

The insulation shall be passed down with aluminium foil adhesive tape, secured with bands or straps, and shall have on overall fire classification of B-s2 d0 as defined in BS EN 13501-1.

The thickness range of the insulation shall vary by piping diameter as follows:

15 mm to 50 mm pipe 16 mm insulation thickness

65 mm to 100 mm pipe 25 mm insulation thickness

All externally placed insulated pipe works shall be adequately protected from the elements by a high molecular weight polyisobutylene (HMWPIB) sheathing, self-extinguishing. The weather proofing shall be guaranteed for a period of 5 years.

### Valves

Valves shall be made of the same material as the pipework being used and shall be of the same brand and from the same manufacturer as the pipe on which it is installed.

Drain cocks are to be installed at the bottom of each run. Automatic air vents shall be inserted at the high points of each section.

Provision is to be made for the use as necessary of Automatic Air Vents, with copper or S/S steel floats and guides, and non-corroding ball needle valve and seats. A lockshield valve shall precede all air vents.

Valves, etc., shall be installed wherever in the system they are necessary so that this can be closed off without affecting the remaining sections. Some of the important nodes and positions are indicated in the drawings, but these are not exhaustive, and the consultants’ recommendations shall be marked on the contract documents, in this respect, and shall serve as a basis for the works.

### Motorized Valves

The motorized valves shall be installed as indicated in the Schematic Drawings, there shall be both two way and three-way motorized valves. The two-way valves shall be used to fill/drain the rehabilitation tanks, whilst the three-way valves shall be used to operate/bypass the heat exchangers or UV filters, and shall be operated remotely from the tank control panels.

### Water Storage Tanks

These Water tanks shall be of a plastic polymer construction and shall incorporate input and output socket connections and shall be supplied complete with ball valve, valves drain point and valve, overflow pipe etc. The size shall be as indicated in the bill of quantities/drawings. The outer skin of the tank shall be UV stabilised and shall be translucent such that it shall inhibit algae growth. The tanks shall be suitable to be installed in the locations as indicated in the drawings.

### Pressure boosting pump sets

This specification applies for the first-class water pressure boosting set. Pressure boosting pump set shall of the multi-stage type. They shall have a suction and delivery headers in stainless steel (316L), isolation gate valves in suction and delivery of each pump with a non-return valve in the suction side, anti-vibration rubber feet, by pass circuit between suction and delivery manifold with an on/off valve and an automatic valve for pressure relief. The pump body shall be in a non-corrosive metal with bronze impellors and stainless-steel mechanical seals.

The pumps shall be supplied with an integral control panel. The panel shall be supplied c/w thermal overload protection for the pumps with reset button, run timer to control the number of starts, protection fuses, auxiliary low voltage contacts with fuses to connect float switches to inhibit the function of the pump if the reservoir runs dry, a switch to select ‘manual’, ‘auto’, ‘off’ for each pump, and pressure switches / transducers. The pumps shall be supplied complete with pressure vessels and pressure switches. Both pumps shall be variable speed controlled in order to maintain a constant pressure throughout the range of operation of the set. The control panel shall be interfaced to the BMS System of the building to provide monitoring and control.

Each of the two pumps shall have the following minimum characteristics:

|  |  |  |
| --- | --- | --- |
|  | Flow rate | As indicated in the drawings. |
|  | Head | As indicated in the drawings |
|  | Power Supply | 400 V, 3 Phase, 50 Hz |
|  | Starting | Variable speed drive |
|  | Control | Constant pressure |

All Stainless-Steel Components shall be in 316L.

### Hot Water System

#### Water Heater

These shall be of the insulated tank electric glass lined type water heaters operating on 230 V 50Hz supply. They shall house high efficiency solid copper heating element having a storage capacity as indicated in the drawings. They shall have an automatic thermostat that shall keep the water at a constant temperature. They shall also have manual temperature control with accurate temperature control features. They shall be equipped with a safety cut-off feature in case of water absence or excess temperature situations. They shall also have visual indication showing whether they are in operation.

They shall be supplied with factory temperature and pressure relief valves. They shall also incorporate a drain valve, to facilitate emptying during maintenance.

### Rehabilitation Tanks Systems

#### 5.3.11.1 Primary Water Circulation pumps

These shall be hot water circulating pumps for the heating system of the turtle rehabilitation tanks with ratings as indicated in the drawings. These shall be of the horizontal in-line type, suitable for circulating water at the required temperature. Particular attention shall be given to low noise operation. The casing, seal housing, base-plate and subframe shall be high grade cast iron to BS Specification 1452. Impeller shall be high grade Gunmetal to BS Specification 1400, with renewable Phosphor-Bronze casing sealing rings and self-adjusting mechanical seal. The motor shaft shall extend into the pump, and is to be shielded from the pumped liquid by a hub on the impeller. The pump shall be supplied complete with thermally protected starter and anti-vibration mounts. Each pump is to have the following minimum characteristics:

|  |  |  |
| --- | --- | --- |
|  | Flow rate | As indicated in the drawings. |
|  | Head | As indicated in the drawings |
|  | Power Supply | 230 V, 1 Phase/ 400V 3Ph, 50 Hz |
|  | Starting | VSD |

#### 5.3.11.2 Secondary Water Circulation pumps

These shall be water circulating pumps for the turtle rehabilitation tanks with ratings as indicated in the drawings. These shall be of the horizontal in-line type, suitable for circulating water at the required temperature. Particular attention shall be given to low noise operation. The pump shall be suitable for seawater operation. The casing, seal housing, base-plate and subframe shall be high grade cast iron to BS Specification 1452. Impeller shall be Stainless Steel 904, with renewable Phosphor-Bronze casing sealing rings and self-adjusting mechanical seal. The motor shaft shall extend into the pump, and is to be shielded from the pumped liquid by a hub on the impeller. The pump shall be supplied complete with thermally protected starter and anti-vibration mounts. Each pump is to have the following minimum characteristics:

|  |  |  |
| --- | --- | --- |
|  | Flow rate | As indicated in the drawings. |
|  | Head | As indicated in the drawings |
|  | Power Supply | 230 V, 1 Phase/ 400V 3Ph, 50 Hz |
|  | Starting | VSD |

#### 5.3.11.3 Thermal Accumulator

There shall be a thermal accumulator located in the pump room beneath the viewing platform as indicated in the drawings.

The thermal accumulator shall have an inspection hole and cover 45cm dia. The battery shall consist of copper U tubes with external tinned surface, expanded into brass tube plates with cast iron base, to raise the temperature of the water from 16°C to 90°C by means of Solar water collectors and an auxiliary Electrical water heater. Working head should be for 20m and instrumentation shall include dual thermometer, pressure gauge, besides a safety valve and drain cock. Insulation shall be closely fitting fibre glass or equivalent. The inside shall, be protected against electrolytic action.

The calorifiers shall have the following additional characteristics:

|  |  |
| --- | --- |
| Capacity | 2000 lts Vol |
| Type | Horizontal Galvanised Steel Outer Shell |
| Construction | Fixed Head, Convex Bottom |
| Installation | On fixed legs. |
| Inside surface | Glass lined |

#### 5.3.11.4 Plate Type Heat Exchanger

The Turtle Rehabilitation tanks shall be heated by means of plate type heat exchangers. The plate type heat exchanger shall be suitable for sea water operation. Heat exchange shall be carried out between the hot potable water in the primary side, and sea water on the secondary side. The plat type heat exchanger shall be of the gasketed type.

The units shall have the following characteristics

Type Plate type

|  |  |
| --- | --- |
| Material | Titanium |

The exchanger shall be supplied complete with wall mounting brackets, end plates, connections, lagging, cladding etc. for a complete system.

#### 5.3.11.5 Solar Collector

The solar collector shall consist of a number of parallel vacuum tubes with a minimum surface area of 4m2. The collectors shall be made of vacuum tubes mechanically bonded to copper fins to increase their surface area and shall have an absorption coefficient ‘α‘of 0.95. The vacuum tubes shall consist of two glass tubes made from tempered solar glass. The outer tube shall allow light rays to pass through with minimum reflection, while the inner tubes shall have a special coating to increase the solar radiation absorption and provide minimum reflection. The vacuum tubes shall be such that should one need to be replaced this can be done without the need to empty the tank.

The fluid flowing through these tubes shall be of a non-corrosive type. The insulation shall be glass fibre and have a minimum thickness of 3cm.

#### 5.3.11.6 UV Filter

The UV Filter shall form part of the turtle rehabilitation tank circulation system. The UV Filter shall be used when necessary to get rid of any bacteria and algae present in the tanks. The UV filter shall be suitable for sea water operation and shall be installed as per schematic drawings, in order to be able to bypass/operate the UV filter as may be necessary. The wattage of the UV Filters shall be as indicated below:

|  |  |
| --- | --- |
| For 1.2m dia. tanks | 50W |
| For 2.0m dia. tanks | 150W |
| For 3.0m dia. tanks | 450W |

### Rehabilitation Tanks Motor Control Panel

This will comprise of a stand mounted, IP68, grp Enclosures, situated adjacent to each tank as indicated in the Drawings. These shall control the overall operation of the tanks, including all circulation pumps both primary and secondary, temperature setting, motorized valves, UV Filtration etc.

The Control Panel shall include:

* Suitably rated thermal / magnetic motor circuit breakers.
* Power contactor or contactor set.
* Pre-determined function buttons:
  + 10% Drain
  + Complete Drain
  + Fill
  + UV On
  + UV Off
  + Heating
  + Circulation On
  + Circulation Off
* Communication to a central PC based controller situated in the office adjacent to the tank area, as indicated in the Drawings.

The control panels shall be complete with a screen to portray relevant information related to the rehabilitation tanks, mainly, Temperature reading of the water and Water Level of the rehabilitation tanks, Ambient temperature, Sea water Temperature in the Settling Tank, and Water Temperature in the Thermal Accumulator. Water Level values shall be portrayed as percentages, when the tank is empty it is to portray the water level at 0% and when the water level is at 1.2m i.e. the maximum water level, it shall read 100%.

The operation of the control panel shall be as follows:

#### 10% Drain – Pre-Determined Function

On a daily basis, a 10% discharge of water is required. This shall be carried out by pressing the pre-determined button on the control panel. Once the button is pressed, a signal is sent to the motorized drain valve and this is opened. Upon reaching the desired 10% reduction, the water level sensor shall send a signal to the motorized drain valve to close.

#### Complete Drain – Pre-Determined Function

Once a complete drain is required, the pre-determined function shall be operated by pressing the respective button. The complete drain function shall open the main motorized drain valve and the secondary motorized drain valve to completely drain both the main tank and the small tank attached to it. This function shall also switch off the circulation pump.

#### Fill – Pre-Determined Function

In order to re-fill the tank up to the 100% required the inlet motorized valve shall be switched on, once the fill function is pressed. Once the 100% desired level is achieved, a signal from the water level shall be sent to close the inlet motorized valve.

#### UV On – Pre-Determined Function

UV filtration is required in order to get rid of any algae or bacteria that might be present in the water. This however shall not be required constantly and shall only be switched on when necessary. Once the UV On function is pressed the UV filter is switched on and the Bypass motorized valve is closed off for water to pass through the UV Filter as indicated in the Schematic Diagram.

#### UV Off – Pre-Determined Function

Once the UV filtration is no longer required, and the UV Off function is pressed, the UV Filter shall be switched off and the bypass valve shall be opened to bypass the water as indicated in the Schematic Diagrams.

#### Heating – Pre-Determined Function

The water supply from the borehole is generally of a constant temperature of around 19-20°C, this temperature is the desired temperature for the rehabilitation of turtles. If the temperature from the borehole is of a lower temperature, or the required temperature of the tank is required to be at a higher temperature, the temperature setpoint can be programmed from the central control accordingly.

Once the heating function is pressed, temperature reading are taken from both the turtle rehabilitation tank and the thermal accumulator. In order to heat the water of the turtle tanks, the temperature of the thermal accumulator shall be higher. If the temperature of the thermal accumulator is lower, the electrical auxiliary heater inside the thermal accumulator shall be switched on. Once a higher temperature reading is achieved in the thermal accumulator, the primary pump shall be switched on, on the motorized valve bypassing the heat exchanger shall be closed off to direct water through the heat exchanger as indicated in the schematic drawings.

Once the desired temperature is achieved inside the turtle rehabilitation tank, the motorized valve shall be opened again to bypass the heat exchanger and the primary circulation pump shall be switched off.

such that the secondary circulation pump shall be switched on separately than the rest of the equipment. Upon switching of the primary pump, in order to heat the water to the desired set temperature, the motorized valve for the Heat exchanger bypass shall be closed in order for the water to flow through the heat exchanger, as indicated in the Schematic diagrams.

#### Circulation On – Pre-Determined Function

Once the tank is set up and ready to house the turtle, the circulation shall be switched on by pressing the pre-determined button respectively.

#### Circulation Off – Pre-Determined Function

Once the Circulation Off pre-determined button is pressed, the circulation pump shall be switched off. Also, once the function is requested, any relevant equipment related to the secondary circulation circuit, shall also be switched off. These include the UV Filtration and the Heat exchanger.

The control panels shall also be able to communicate with the central PC Based Controller, which will replicate the controls and monitoring feature of the control panel. The cost of the control panel is to be inclusive of all power, control cables, interfacing equipment and any ancillary items necessary for a complete working system.

All the relays and contactors that shall be installed in the Control Panels, shall be of the Solid-State type.

The functions as specified above, shall be pre-determined and programmed at commissioning stage. The controller shall have password levels such that the person operating the tank systems, will not be able to change the pre-set parameters unless he/she has the password to enter into programming mode. The main controller shall, be located in the Office near the tank area as indicated in the drawings.

The contractor shall submit all relevant technical submittals in relation to the system, including the logic sequence for the pre-determined functions as specified above. The system shall also be suitable to modify/program/increase functions as deemed necessary in the future.

# 6.0 SPECIFICATION FOR EXTRA LOW VOLTAGE INSTALLATIONS

The following installations shall be suitable for a saline environment. Hence, all installations shall be of polycarbonate construction or stainless steel 316L construction, installations using equipment with aluminium construction shall not be acceptable.

## *PREAMBLE TO THE SPECIFICATION*

The contractor shall prepare such installation diagrams, wiring drawings and schematics as may be necessary in the Engineer's opinion. These shall be submitted to the engineer for approval before execution of the work.

The contractor shall keep such records as necessary, in order to be able to complete the as-fitted drawings upon completion of the works.

The whole works shall be scheduled by the Principal Contractor on site by consulting the engineer and client’s requirements. The contractor is responsible for preparing an overall works programme which shall require the approval of the engineer and client. The contractor shall bind himself to co-ordinate the programme of works with the works of other contractors.

The Principal contractor is to submit technical literature covering all key components of the system being proposed.

## *GENERAL*

### 6.2.1 Regulations

The whole of the works shall be executed to the entire satisfaction of the Engineer and shall comply with the B.S. / Relevant European Norms.

### 6.2.2 Standard Specification

All the material used shall comply with the relevant B.S. / EN Should the contractor quote for equipment of different specifications he shall give a full description of the standards to which the equipment conforms.

### 6.2.3 Electricity Supply

The electricity supply shall be 230V 50Hz earthed neutral.

### 6.2.4 Other Services

The following works are covered by other sections of the specification:

(i) Provision of electrical supply points.

(ii) Laying of all necessary conduit and trunking.

### 6.2.5 Uniformity

All materials used under this contract shall be of uniform design throughout. Similar parts and equipment being interchangeable.

### 6.2.6 Testing and Commissioning

The contractor shall provide all the necessary instruments and labour to test the system and show its performance to the satisfaction of the Engineer and Client. Test results shall be recorded in triplicate and signed by the Engineer and the contractor.

### 6.2.7 Installation

The installation shall be carried out in PVC conduit surface mounted or concealed as specified, as well as in galvanised trunking where indicated on the drawings. In case of fire detection, the appropriate fire resistance cable cleats shall be used.

Single strand conductors shall not be accepted. The cables used shall satisfy the specification for fire-resistant cables and shall be of the LSZH type.

The cables used for the various installations shall be as follows

|  |  |
| --- | --- |
| *Data installation:* | *Cat 6 LSZH / Corrugated Steel Armoured Fibre Optic* |

Connections in cables shall not be allowed except at terminations and fittings unless otherwise authorized in writing by the Engineer.

All the cables shall be clearly marked at terminations and along their length for clear identification if, and when required.

### 6.2.8 Submittals

The contractor is to submit technical literature covering all key components of the system being proposed.

## *MATERIAL SPECIFICATION – CAT6 cable installation*

### 6.3.1 Data Cable

Horizontal distribution cable for data circuits shall be Category 6. The cabling shall be 23 AWG, 4-pair, F/UTP, with a LSZH jacket suitable for external use, with UV stabilized outer jacket. Cable jacketing shall be lead-free. The cable shall meet all the performance requirements listed in the Category 6 standard. The cable shall be supplied on wooden reels or in reel-in-box.

Cable shall be installed in accordance with manufacturer’s recommendations and best industry practices. Cable tray, trunking and conduits shall not be filled greater than the ISO/IEC 14763-2 maximum fill for the particular pathway type. Cables shall be installed in continuous lengths from origin to destination (no splices). The cable’s minimum bend radius and maximum pulling tension shall not be exceeded. Cable bundles and all horizontal cables shall be supported at a maximum of 1.2m intervals. At no point shall cable(s) rest on false ceiling grids or panels. Horizontal distribution cables shall be bundled in groups of not greater than 48 cables. Cable bundle quantities in excess of 48 cables may cause deformation of the bottom cables within the bundle. The contractor shall install clips to support the cabling. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor at his own cost prior to final acceptance. Shielded twisted pair cable shall be installed so that there are no bends more than four times the cables outside diameter (4 X cable O.D.) at any point in the run. Pulling tension on 4-pair cables shall not exceed 150N for a single cable or cable bundle.

Patch panels shall be 1U or 2U high and provide 24 or 48 modular jack ports, wired to T568B. Each port shall be capable of accepting an icon or label to indicate its function. Termination of cables on Patch Panel modular jacks shall be completed using a hand tool which employs a fully repeatable, self centering, non-impact mechanical termination process. Each patch panel shall be solidly bonded to the building’s electrical ground system in order to properly ground the shield of the cables terminated on it. The contractor is to supply all the materials and labour necessary for the construction of a suitable grounding point should this not be already present in the room that houses the wiring cabinet. The grounding point used to earth the patch panels shall be connected directly to the building’s earth mat so that it is at the same potential as the electrical power ground; however it must not use the same earth conductors as the electrical power installation.

Each Category 6 cable shall be terminated at the outlet location on an 8-position, 8-conductor Category 6 jack to the T568B colour code. The termination shall be carried out using a hand tool which employs a fully repeatable, self-centering, non-impact mechanical termination process. This process shall simultaneously cut and terminate all 8 conductors to the modular jack. The outlet plates, unless otherwise noted, shall be mounted to single gang boxes, recessed and / or surface mount boxes as required. Back boxes must be supplied where required. Floor boxes including any necessary mounting plates, as required, will be supplied by the contractor and installed as indicated in the attached drawing.

Cables shall be dressed and terminated in accordance with the recommendations made in the ISO/IEC 11801 2nd Edition document, manufacturer’s recommendations and/or best industry practices. Pair untwist at the termination shall not exceed 6mm for Category 6 connecting hardware. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable. The cable jacket shall be maintained as close as possible to the termination point.

All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions. The contractor prior to system acceptance shall verify all conductors of each installed cable useable. Any defect in the cabling system installation including but not limited to cable, connectors and patch panels shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed. Any repaired or replaced cables shall be re-tested prior to final acceptance.

The balanced copper channels shall be tested using a level IIIe tester as specified in IEC61935-1. Level IV testers may be used, provided they meet the accuracy level IIIe as specified in IEC 61935-1, when using a 8 position RJ45 modular interface. Level IV testers as specified by IEC 61935-1 are only specified using a Category 7 interface and can therefore not by default meet the accuracy level specified for level IIIe. This verification has to be proven by the manufacturer or by 3rd party certification.

Each pair of each installed cable shall be tested using a “green light” test set that shows opens, shorts, polarity and pair-reversals. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests.

Each installed cable shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel and patch panel to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ISO/IEC 11801 2nd Edition Standard. For multipair cables, the longest pair length shall be recorded as the length for the cable.

Category 6 data cable shall be performance verified using an automated test set to ISO/IEC 11801 2ND Edition CLASS EA -CH Channel parameters. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the ISO/IEC 11801 2nd Edition Standard.

All test results shall be recorded as pass/fail and referenced to the appropriate cable identification number and circuit or pair number. In addition, each measured value of each test parameter shall be recorded, displayed in relation to the appropriate test limits and referenced to the appropriate cable identification number and circuit or pair number. A copy of the test results shall be submitted by the contractor, in both hard copy and electronic formats, upon final commissioning

### 6.3.2 19’’ Network Cabinet

Unless otherwise indicated on plans: The cabinet should have the following dimensions: -

* Standard Data Cabinets 800mm wide by 800mm deep

The network cabinets shall be designed in accordance to the following standards: IEC 60297-3-100, DIN 41484 parts 1 and 7, ANSI/EIA-310-E and UNE 20 539-2. The unit shall have louvers on the bottom panel and shall have four factory fitted 6”ventilation fans on the uppermost board. It shall have four 19-inch universal uprights that can be easily adjusted front to rear from inside the cabinet without the need to open the side panels. The front and back rails shall have the U positions marked on them. It shall be constructed of minimum 16-gauge steel. The front panel shall be made of clear plexi-glass such that all items fitted in the cabinet can be clearly visible without opening the front panel. The front panel shall be hinged. The panel shall be lockable with a key. The side panels shall be dismountable.

Furthermore, the cabinet shall be supplied complete with the following accessories:

* One 1U horizontal mounting, 12-way power distribution unit (PDU) with IEC-320-C13 outlets. The PDU shall be equipped with a cable retaining bracket to which the equipment power cords can be secured.
* Vertical cable management channels mounted front and back, one next to each of the four 19-inch uprights. Each channel shall be equipped with detachable cable retainers to hold the cables securely inside the channel while allowing easy access for passing cables. Each channel shall be at least 100mm wide x 120mm deep
* A suitable number of 1-U horizontal cable management frames to allow the patch-cords from each patch panel port to be safely housed and routed to the switch ports as necessary.

All the cabinet accessories shall be procured from the same manufacturer as the cabinet itself so as to ensure compatibility and a neat final installation. Size shall be as indicated in the BOQ.

### 6.3.3 Wall plates

The wall plates shall be of the following two types;

* Dual: capable of holding up to two RJ-45 CAT6 modular socket outlets and suitable to fit a 3’’ x 3’’ box.
* Quad: capable of holding up to four RJ-45 CAT6 modular socket outlets and suitable to fit a 6’’ x 3’’ box.

Suitable blank plates shall be provided for all wall plates that shall not be equipped with their full capacity of modular socket outlets, as required. All outlets shall be such as to accept an icon or label in order to simplify identification. A sample wall plate of the exact model and colour shall be supplied at tendering stage. The wall plates shall be white plastic of the same colour as the rest of the wiring accessories being used in the project.

The wall plates shall hold the modular socket outlets at an angle so as to maximise the bending radius of the CAT6 wires inside the outlet box. In any case, the bending radius of the cable at the termination outlets shall not be less than 4 times the outside diameter of the cable. The modular socket outlets shall be snap-in, such that they can be easily replaced if damaged.

### 6.3.4 Earthing of External Access Points

The external access points installed throughout the project shall be equipped with an Ethernet Surge Protector. The surge protector shall have Ethernet In and Out points and complete with a grounding point. The surge protector shall be suitable to ground both directly to grounded metal pole, or via a drain wire that is connected to a grounding structure. The External Access point itself shall also be grounded. For the External Access points a surge protector shall be installed next to the device and another ethernet surge protector shall be installed at the entry point of the building.

## *Optic Fibre*

All cabling shall consist of a fully terminated optical fibre cable terminated in LC couplers with pigtails, using fusion splicing, and housed in suitable pre-loaded Duplex rack mountable patch panels. These terminations shall occupy 1U in the enclosure. The number of optical fibre counts, per cable, shall be according to the BOQ. It must comply with ISO/IEC 11801:2002 standard. Straight-through fusion splices should be used at any joint where this is required. The cable should be constructed of 50/125µm core/cladding diameter OM4 multimode graded-index fibres and sheathed for internal/external use. Any external runs shall also be suitably UV protected. All accessories shall be supplied and installed by the contractor. The optical fibre cable entering the termination enclosures and any relevant boxes shall be suitably protected by grommets and securely tied. The cable’s minimum bend radius and maximum pulling tension shall not be exceeded.

Furthermore, the optical fibre cable used shall be corrugated steel tape armoured, anti-rodent type, suitable for installation externally and have a gel-filled, loose-tube construction. It must have a water-blocking glass-yarn armour and be externally covered with a polythene sheath. Full specification of the cable proposed should be included with the tender.

Each terminated optical fibre shall be tested end-to-end using an OTDR or similar industry standard test equipment and will be certified to comply with the 1000BASE-SX, 1000BASE-LX, 10GBASE-SR and 10GBASE-LRM standards.

Type 50/125um multimode strands OM4

colour coded

<1.25dB/km at 1300nm

Flame retardant (IEC 60332-3)

Halogen free (IEC 60754-2)

Rodent resistant

Corrugated Steel Tape Armoured

Cabling Standard BS EN50173

Multimode Fibre

Optic Attenuation

Measurement IEC 61280-4-1 (Multi mode Optical fibres)

Performance

Standard EIA/TIA 568B.3

Optical Fibre Cables

Generic

Specifications IEC 60794-1

Optical Fibre Cables

Protection and

Sheathing Standard IEC 60332-3-25

# SECTION 5 – SUPPLEMENTARY DOCUMENTATION

## 5.1 – Draft Contract Form

## 5.2 – Glossary

## 5.3 – Specimen Performance Guarantee

## 5.4 – Specimen Tender Guarantee

## 5.5 – General Conditions of Contract

The full set of General Conditions for Works Contracts, for Supplies Contracts and for Services Contracts (latest version as applicable on the date of the publication of this tender) can be viewed/downloaded from the ‘Resources Section’ at:

[www.etenders.gov.mt](http://www.etenders.gov.mt)

It is hereby construed that the tenderers have availed themselves of these general conditions, and have read and accepted in full and without reservation the conditions outlined therein, and are therefore waiving any standard terms and conditions which they may have.

These general conditions will form an integral part of the contract that will be signed with the successful tenderer/s.

## 5.6 – General Rules Governing Tendering for NGOs

The contents of this procurement document complement the latest version of the General Rules Governing Tenders applicable on the date of the publication of this tender, the Terms of Use and the Manual for Economic Operators applicable to Government’s e-Procurement Platform (available from the Resources section of [www.etenders.gov.mt](http://www.etenders.gov.mt)).