**Volume IV.**

**Part 1: Technical proposal**

**Part 2: Technical offer schedules and Functional Guarantees**

**Part 3: Schedules of prices / pricing schedules**

|  |
| --- |
| Part 1- Technical proposal  Technical Proposal (specifically for the project) to be provided by the bidder covering the following components : |

* Site Organisation
* Method Statement
* Mobilisation Schedule
* Construction Schedule
* Plant
* Contractor’s Equipment
* Personnel
* Proposed Subcontractors for Major Items of Plant and Installation Services
* Health and Safety Plan
* Quality Assurance Plan
* Environmental Management Plan

**Checklist of documents to be submitted with technical proposals**

* **Drawings and calculations**
* **Technical descriptions/specifications**
* **Proposals for management**
* **Designers**
* **Details of key staff who would be employed on the contract.**
* **Subcontractors and suppliers**
* **List of proposed major subcontractors, together with details of those parts of the works which the tenderer would propose to subcontract.**
* **Proposals for site establishment/facilities**
* **Programme for design and construction**
* **Payment plan/ cash flow forecast**
* **Proposed methods of construction, with resources**
* **Proposed environmental protection measures**
* **Health and safety and environmental protection plan**
* **Quality management and control**
* **Tender programme for execution of the works.**
* **Proposal for accommodation of the contractor's employees.**
* **Projected build-up of labour on the site, both local and foreign.**
* **Contractor's estimate of the electrical power requirements on the site.**
* **Method statements.**
* **List of contractor's equipment proposed.**

**Form 1.1. Understanding of scope of works**

*The Tenderer shall provide his understanding of the scope of works, complexity of works, goals and objectives of the project in general and design and build contract in particular*

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.2. Methodology and Organization**

*The Tenderer shall provide general description of the arrangements and construction method statement which the Tenderer intends to adopt for the execution of the Works. The Tenderer’s arrangements and method statement should demonstrate their adequacy for satisfactory execution of the Works in conformity with the Tender Documents. The Tenderer shall provide its design and construction proposal.*

*The Tenderer shall provide details relating to the sources of the key materials (structural steel, reinforced concrete, steel reinforcement, wood, cement etc), estimated transportation distances for the materials.*

*The Tenderer shall describe in details the equipment he is proposed to install: manufacturers, country of origin and model/type/size, number, materials of equipments, nominal/rated power and other information must be stated completely.*

*If the Tenderer’s Proposal includes further devices that are not listed or not specified in the Employer’s Requirements, the Tenderer shall state the main characteristics for any such device.*

*The tenderer shall prepare a list of the proposed equipment and materials that will be further described as the schedule requires, using the following template.*

*The Tenderer shall provide information about potential suppliers of equipment in accordance to specification in Employer Requirements Volume III. The Tenderer may include additional information about equipment and materials (Manufacturer’s brochures) as attachment.*

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.3. Work Schedules**

*The Tenderer shall provide information and schedules showing the way in which the Tenderer intends to carry out the Works including the anticipated timing of each stage of the performance of the Contract including but not limited to:*

1. *Investigation and design works;*
2. *mobilization of the Contractor’s Plant and Equipment;*
3. *execution of each key construction activity including anticipated construction rates and estimated timing for commencement and completion;*
4. *critical milestones*

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.4. Budget allocation / payment schedule**

*The Tenderer shall provide its proposed payment schedule.*

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.5. Organization Chart of the Works**

*The Organization Chart of Works shall show the position and the relations to each-other of the Employer, the Contractor, the Engineer, with details for each member of Joint Venture/Consortium (if applicable), Sub-contractors, the Project Manager, and the other key personnel participating in the completion of the Works with their position and names.*

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.6**

**Key personnel**

**(To satisfy the minimum requirements shown in the bid data sheet of volume I, and to the extent necessary as the bidder considers appropriate and required for the project)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Position** | **Name, surname** | **Age** | **Education** | **Years of experience in construction** | **Experience in major works relevant /similar to the Tender requirement** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**FORM 1.7**

**Equipment to be used**

**(To satisfy the minimum requirements shown in the bid data sheet of volume I, and to the extent necessary as the bidder considers appropriate and required for the project)**

*(loaders, cranes, excavators and other machinery to be used by Tenderer for performance of planned construction works. Note: please do not provide information on all equipment possessed by the company, but only planned for utilization for needs of this particular contract)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **№**  **п/п** | **Name of equipments** | **Manufacturer** | **Date of production** | **Technical parameters** | **Ownership (Applicant’s ownership, subcontractor’s ownership or other)** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.8**

**Information on Sub-Contracting**

|  |  |  |
| --- | --- | --- |
| **Name of the company, Reg.No, address, contact person** | **Scope of Subcontract Works %** | **Brief description of planned Subcontract Works** |
|  |  |  |
|  |  |  |
|  |  |  |

**Attach signed pre-agreement**(s) with the above - listed subcontractor(s) that are planned to provide more than 10% of the works.

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Form 1.9**

**Health and Safety Plan**

The contractor should provide a Safety, Health & Welfare plan, being part of the overall program of works.

The above mentioned Safety, Health & Welfare plan shall be based on the following Safety manuals and other applicable international safety guidelines

**Safety and Health in Construction: An ILO code of practice**

**Safety, health and welfare on construction sites: A training manual**

Both of the above documents are available online **at the ILO website:** [**http://www.ilo.org**](http://www.ilo.org)

<http://www.ilo.org/safework/info/standards-and-instruments/codes/WCMS_107826/lang--en/index.htm> (**Safety and Health in Construction: An ILO code of practice)**

<http://www.ilo.org/safework/info/instr/WCMS_110237/lang--en/index.htm> (**Safety, health and welfare on construction sites: A training manual)**

**Form 1.10**

* **Quality Assurance Plan**

**Refer to Part 2 of the other requirements contained in volume III**

**Form 1.11**

**Environmental management plan (EMP)**

In order to address potential environmental impacts associated with the construction of the Works as outlined in the Tender Document, the Tenderer shall with his Contractor’s Proposal submit an EMP. The EMP may include, but should not necessary be limited, to the following:

1. **Minimize Equipment Impacts** related to the use of heavy machinery in relation to human health and the general environment. This includes minimizing potential damage on the vegetation to the local existing infrastructure and private properties, noise emissions, traffic impacts, dust and accidental spills of combustibles which may lead to the contamination of potable water;
2. **Quarries and Borrow Pits**, the Tenderer shall describe from where he will extract the materials and which measures he will take in order to minimize the environmental impact, during and after the construction period.
3. **Materials Storage**, the Tenderer shall describe all the measures which he will take in order to minimize the environmental impact from the materials temporary storage area.
4. And any required measures as per the required specifications and the acceptable and applicable international standards in this regard

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**FORM 1.12**

**Further information**

Under this form the Tenderer should provide:

Comments on any ambiguities in the Employer’s Requirements, if applicable.

Further information the Tenderer may deem useful.

Signature of Tenderer’s authorized person \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name, surname, position\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Part 2: Technical offer schedule**

Facilities /Components

Bidder to insert technical proposal for the components/facilities and complete Form FUNC and schedules below.

**Preamble**

The Bidder shall enter and provide with his Tender the Technical Particulars detailed in the following Schedules, for Facilities to be provided under the Contract. The particulars so entered shall be binding on the Contractor and shall not be departed from without the specific approval of the UNDP Project Manager and Project technical committee, but shall not limit the responsibility of the Contractor to provide components conforming to the requirements of the Specifications. Where the information to be provided is such that it cannot be entered in the Schedule then the Schedule shall contain a reference to the information which shall be provided separately.

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| **Schedule 1: Penstock** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidder technical Offer** |
|  | **General** |  |  |
|  | Standards and design codes utilized – in accordance with Clause 13.1.1 | BS EN |
|  | General arrangement drawings (to be attached) |  |
|  | Place of manufacture/rolling |  |
|  | Place of fabrication, inspection and testing |  |
|  | Place of factory inspection and testing |  |
|  | Steel grade | BS EN |
|  | Corrosion thickness allowance | mm |
|  | Rugosity values used in determining head losses | mm |
|  | **Penstock Shell–Section 1[[[1]](#footnote-1)]** |  |
|  | Start chainage | m |
|  | Finish chainage | m |
|  | Design discharge | m3/s |
|  | Design Pressure | N/m2 |  |
|  | Steel minimum yield strength | N/mm2 |
|  | Internal diameter | mm |
|  | Steel thickness | mm |
|  | **Dismantling Joints** |  |  |
|  | Locations |  |
|  | Type |  |
|  | Number | nr |
|  | **Supports ( i.e. anchor blocks)** |  |
|  | Type |  |
|  | Number | nr |

| **Schedule 2: Hydro Mechanical Equipment** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **BIDDERS OFFER** |
|  | **Weir Environmental Flow outlet** |  |  |
|  | Type of outlet |  |
|  | Number of flow outlets | each |
|  | Manufacturer |  |
|  | Type, reference (datasheets and brochures to be attached) | DIN |
|  | Diameter | mm |
|  | Flow at max head | m3/s |
|  | Flow at min head | m3/s |
|  | Material |  |
|  | **Weir sand flashing sluice Gate (Bottom outlet)** |  |
|  | Type of gate |  |
|  | Manufacturer |  |
|  | Type, reference (datasheets and brochures to be attached) | DN |
|  | Place of manufacture, inspection and testing |  |
|  | Overall height of gate – *provisional* | mm |
|  | Overall width of gate | mm |
|  | Gate leaf thickness of gate | mm |
|  | Normal operating water level | m |
|  | Minimum operating water level | m |
|  | Maximum water level | m |
|  | Discharge at maximum operating head | m³/s |
|  | Discharge at minimum operating head | m³/s |
|  | Material gate body |  |
|  | Material gate leaf |  |  |
|  | Type of sealing system |  |
|  | Material sealing faces |  |  |
|  | Material sliding faces |  |
|  | **Penstock Intake Trash Screen** |  |
|  | Number of screen panels | Set |  |
|  | Manufacturer |  |
|  | Type, reference (datasheets and brochures to be attached) |  |
|  | Overall height each screen panel | m |
|  | Overall width each screen panel | m |
|  | Levels of trash screen panels: |  |
|  | * Top | m |
|  | * Bottom | m |
|  | Maximum design flow velocity through screens | m/s |
|  | Slope of screens |  |
|  | Bar centres | mm |
|  | Section of bars | mm×mm |
|  | Approx. weight of panel | kg |
|  | Loading conditions: |  |
|  | Design impact load | tonnes |
|  | Method of bar removal |  |
|  | **Penstock Intake Manual Trash Rake** |  |
|  | length | m |  |
|  | width | m |  |
|  | max rake depth of operation. | m |
|  | Material of construction |  |
|  | Special features: |  |
|  | **Penstock Intake Gate** |  |
|  | Type of gate |  |
|  | Manufacturer |  |  |
|  | Type, reference (datasheets and brochures to be attached) |  |
|  | Max leakage rate of gate at max working pressure | litres/hr |
|  | Overall weight of complete gate | kg |
|  | Weight of gate leaf | kg |
|  | Weight of gate body | kg |
|  | Overall height of gate | mm |
|  | Overall width of gate | mm |
|  | Overall thickness of gate | mm |
|  | Design head | m |
|  | Maximum operating head | m |
|  | Minimum operating head | m |
|  | Material of gate leaf |  |
|  | Type of sealing system |  |
|  | Material of sealing faces |  |
|  | Material of sliding faces |  |
|  | Max leakage rate of gate at max working head | litres/hr |
|  | Levels of trash screen panels: |  |  |
| * 1. - | * top | m |
|  | * bottom | m |
|  | Normal flow velocity through screens | m/s |
|  | Slope of screens |  |
|  | Bar centres | mm |

| **Schedule 3: Inlet Valves** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  |  |  |  |
|  | **Inlet Valves** |  |
|  | Manufacturer |  |
|  | Manufacturer’s General Arrangement drawing number (to be attached) |  |
|  | Manufacturer of castings |  |
|  | Type of valve |  |
|  | Test pressure | N/mm2 |
|  | Bore | mm |
|  | Valve opening time | s |
|  | Valve closing time | s |
|  | Type of service seal |  |
|  | Hardness of service seal |  |
|  | Type of maintenance seal |  |
|  | Hardness of maintenance seal |  |
|  | Maximum leakage through closed valve with service seal under maximum static head | litres/hr |
|  | Maximum leakage through closed valve with maintenance seal under maximum static head | litres/hr |
|  | Method of operation |  |
|  | **Inlet Valve Body** |  |
|  | Type of construction |  |
|  | Material |  |
|  | Design pressure | N/mm2 |
|  | Basis of design – code or standard |  |
|  | Number of sections and location of joints |  |
|  | **Inlet Valve Dismantling Joint** |  |  |
|  | Type |  |
|  | Construction |  |
|  | Material |  |
|  | Material of make-up pipe connecting to manifold |  |
|  | **By-pass Valve** |  |
|  | Type of by-pass valve |  |
|  | Bore of by-pass valve | mm |
|  | Method of operation of by-pass valve |  |
|  | Proposed by-pass capacity | litres/s |
|  | **Inlet Valve Actuation** |  |
|  | Torque required to close valve: |  |
|  | - normal operation | Nm |
|  | - emergency at turbine runaway | Nm |

| **Schedule 4: Turbines and Governors** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **General** |  |  |
|  | General arrangement drawings (to be attached) |  |
|  | Turbine type |  |
|  | Turbine hill charts together with efficiency curves and operating limits (to be attached) |  |
|  | Standards and design codes utilised |  |
|  | Manufacturer |  |
|  | Place of manufacture, inspection and testing |  |
|  | **Turbine data** |  |
|  | Turbine rated net head | m |
|  | Maximum continuous rated output of the turbine unit under the rated net head at rated voltage and power factor | kW |
|  | Discharge of turbine corresponding to the above condition | m3/s |
|  | Minimum continuous rated output of the turbine unit under the rated net head at rated voltage and power factor | kW |
|  | Discharge of turbine corresponding to the above condition | m3/s |
|  | Turbine efficiency at rated net head and 100% of maximum output |  |
|  | Turbine efficiency at rated net head and 75% of maximum output | % |
|  | Turbine efficiency at rated net head and 50% of maximum output | % |
|  | Turbine efficiency at rated net head and 25% of maximum output | % |
|  | Lowest factor of safety of any part of turbine, calculated at yield stress, when running at the maximum runaway speed |  |
|  | Synchronous speed | rpm |
|  | Flywheel effect of turbine rotating parts (GD2) | kgm2 |
|  | Turbine runner diameter | m |
|  | Turbine centre line elevation |  |
|  | Weight of rotating parts of turbine, including runner and shaft | tonnes |
|  | **Runner** |  |  |
|  | Exterior diameter | mm |
|  | Number of runner buckets/cups | mm |
|  | Material of runner |  |
|  | Direction of rotation |  |
|  | **Turbine Shaft** |  |
|  | Manufacturer - shaft forging, heat treatment, machining |  |
|  | Material |  |
|  | Diameter | mm |
|  | Maximum design stress | N/mm2 |
|  | **Shaft Seals** |  |
|  | Type of shaft seals |  |
|  | Manufacturer |  |
|  | **Hydraulic Governor** |  |
|  | Type of manufacturer of governor |  |
|  | Method of speed/frequency detection |  |
|  | Speed/frequency range of adjustment | % |
|  | Permanent speed/load droop range of adjustment | % |
|  | Range of load limiting device | % |
|  | Dead band or governing system inaccuracy | % |
|  | **Governor Pumping Set** |  |
|  | Type of pump |  |
|  | Normal operating oil pressure | N/mm2 |
|  | Maximum oil pressure | N/mm2 |  |
|  | Normal minimum oil pressure | N/mm2 |  |
|  | Oil pressure at which standby pump starts | N/mm2 |
|  | Oil pressure at which it is proposed to initiate emergency shutdown | N/mm2 |
|  | Number of strokes of injector servomotors, hydraulic receiver capable of delivering in emergency condition and hydraulic pumps are not running. |  |
|  | Capacity of each oil pump | litres/s |
|  | Total quantity of oil in system | litres |
|  | Capacity of air compressor, free air | m3/min |
|  | Capacity of air pressure vessel | m3 |
|  |  |  |
|  | **Speed sensing and overspeed protection** |  |  |
|  | Make and type of probes |  |
|  | Full data sheet for probes |  |
|  | Number of probes provided for: |  |
|  | a. Auto-sequencer |  |
|  | b. Tachometers |  |
|  | c. Overspeed protection |  |
|  | Full description of overspeed protection equipment |  |

| **Schedule 5: Power House Hoist** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **General** |  |  |
|  | Standards and design codes utilised | BS |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Class and type hoist: reference datasheets and brochures to be attached |  |  |
|  | Maximum deflection of bridge with max load | mm |  |
|  | Span (between rail centres) | m |  |
|  | Overall length over end carriage buffers | m |  |
|  | Max. overall width | m |  |
|  | Max. height above hoist rail | m |  |
|  | Max. depth below hoist rail | m |  |
|  | Elevation top of hoist rail |  |  |
|  | Main hoist & hook safe working load (SWL) | tonnes |  |
|  | Type of control |  |  |
|  | **Weights** |  |  |
|  | Total weight of hoist in working condition (excluding load) | tonnes |  |
|  | Weight of heaviest single piece | tonnes |  |
|  | Name of heaviest single piece |  |  |
|  |  |  |  |

| **Schedule 6: Cooling Water System** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **General** |  |  |
|  | Total quantity of cooling water required for each turbine generator unit | litres/s |
|  | Schematic and general arrangement drawings (to be attached) |  |
|  | Diameter of cooling water supply pipework | mm |
|  | Standards and design codes utilised |  |
|  | **Hydro Cyclone Separator** |  |
|  | Manufacturer |  |
|  | Place of manufacture, inspection and testing |  |
|  | Type reference (datasheets and brochures to be attached) |  |
|  | Number of hydro cyclone separators units |  |
|  | Max. flow rate | litres/s |
|  | Max. duty flow rate | litres/s |
|  | Pressure drop across cyclone at duty flow rate | m |
|  | Filtration at duty flow rate | microns |
|  | Hydro cyclone separator body max design pressure | bar |
|  | Hydro cyclone separator body material |  |
|  | **Oil-Water Heat Exchangers** |  |
|  | Manufacturer |  |
|  | Type |  |
|  | Operating pressure |  |
|  | Water flow |  |
|  | Oil flow |  |
|  | Water inlet temperature |  |
|  | Water outlet temperature |  |
|  | Material of tube bank |  |  |

| **Schedule7: Drainage System** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **Pumps** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number of pumps per Unit |  |  |
|  | Speed | rpm |  |
|  | Capacity of each pump | litres/s |  |
|  | Max head of each pump | m |  |
|  | Duty head of each pump | m |  |
|  | Max. power required by pump at rated duty | kW |  |
|  | Number of check valves |  |  |
|  | Number of isolating gate valves |  |  |
|  | Drainage control panel |  |  |
|  | Float switches |  |  |
|  | Discharge pipe material and diameter |  |  |
|  |  |  |  |

| **Schedule 8: Air Condition (AC) Systems** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **POWERHOUSE AC PLANT** |  |  |
|  | **Powerhouse Main Extract Fans** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number of fans |  |  |
|  | Normal duty capacity | m³/s |  |
|  | Normal duty static pressure | N/m² |  |
|  | Normal duty speed | rpm |  |
|  | Normal duty motor power | kW |  |
|  | **Battery Room Extract Fans** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number of fans |  |  |
|  | Duty capacity | m³/s |  |
|  | Duty static pressure | N/m² |  |
|  | Duty speed | rpm |  |
|  | Motor duty power | kW |  |
|  | **Toilets Extract Fans** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number fans |  |  |
|  | Duty capacity | m³/s |  |
|  | Duty static pressure | N/m² |  |
|  | Duty speed | rpm |  |
|  | Motor duty power | kW |  |
|  | **Powerhouse/Control Room Air Conditioning Units** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number units |  |  |
|  | Max cooling capacity | kW |  |
|  | Refrigerant type |  |  |
|  | Compressor type |  |  |
|  | Evaporator type |  |  |
|  | Condenser type |  |  |
|  | Unit max electrical power | kW |  |
|  | **Management house (Except Stores & Main Workshop) Air Conditioning Units** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number units |  |  |
|  | Max cooling capacity | kW |  |
|  | Refrigerant type |  |  |
|  | Compressor type |  |  |
|  | Evaporator type |  |  |
|  | Condenser type |  |  |
|  | Unit max electrical power | kW |  |
|  | **Maintainance Workshop Extract Fans** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number fans |  |  |
|  | Duty capacity | m³/s |  |
|  | Duty static pressure | N/m² |  |
|  | Duty speed | rpm |  |
|  | Motor duty power |  |  |
|  | **Warehouse Extract Fans** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number fans |  |  |
|  | Duty capacity | m³/s |  |
|  | Duty static pressure | N/m² |  |
|  | Duty speed | rpm |  |
|  | Motor duty power |  |  |

| **Schedule 9: Maintenance Workshop & Equipment** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **MECHANICAL WORKSHOP EQUIPMENT** |  |  |
|  | **Bench Drill** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type, reference (datasheets and brochures to be attached) |  |  |
|  | Max drill capacity (mild steel) | mm |  |
|  | Overall length of machine | mm |  |
|  | Overall width of machine | mm |  |
|  | Total weight | kg |  |
|  | Power requirement | kW |  |
|  |  |  |  |
|  | **Mobile Electric Arc Welding Equipment** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type, reference (datasheets and brochures to be attached) |  |  |
|  | Number of sets |  |  |
|  | Capacity | amps |  |
|  | Overall height of machine | mm |  |
|  | Overall width & depth of machine | mm×mm |  |
|  | Total weight | kg |  |
|  | Power requirement | kW |  |
|  | **Oxy-Acetylene Welding and Cutting Equipment** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type, reference (datasheets and brochures to be attached) |  |  |
|  | Number of sets |  |  |
|  | Oxygen bottles type & capacity |  |  |
|  | Acetylene bottles type & capacity | s |  |
|  | Overall height of trolley | mm |  |
|  | Overall width & depth of trolley | mm×mm |  |
|  | Total weight with full gas bottles | kg |  |
|  | **Mobile Compressed Air Unit** |  |  |
|  | Schematic and general arrangement drawings (to be attached) |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Operating pressure | bar |  |
|  | Rated capacity free air delivery | m3/min |  |
|  | Max. power at rated duty | kW |  |
|  | Receiver volume | m3 |  |
|  | Maximum receiver pressure | bar |  |
|  | Distribution pipe work size and material | mm |  |
|  | **Hydraulic Jacks** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type, reference (datasheets and brochures to be attached) |  |  |
|  | Numbers: large & small |  |  |
|  | Max capacity: large & small | t |  |
|  | Max travel: large & small | mm |  |
|  | Overall height: large & small | mm |  |
|  | Total weight: large & small | kg |  |
|  | **Hand Operated Chain Blocks** |  |  |
|  | Standards and design codes utilised |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type, reference (datasheets and brochures to be attached) |  |  |
|  | Number |  |  |
|  | Max SWL capacity: | t |  |
|  | Max Liftl | mm |  |
|  | Total weight: | kg |  |
|  | **Miscellaneous Workshop Equipment** |  |  |
|  | Manufacturers |  |  |
|  | Types, reference (datasheets and brochures to be attached) |  |  |
|  | Standards design codes |  |  |
|  | **ELECTRICAL TEST EQUIPMENT** |  |  |
|  | Digital Insulation Resistance Tester |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Rated voltage selection | kV |  |
|  | Rated resistance | MΩ |  |
|  | **Secondary Current Injection & Relay Test Kit** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | **Desktop/Laptop Computer** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Processor type and speed | GHz |  |
|  | RAM | MB |  |
|  | CDRW drive |  |  |
|  | Hard disk capacity | GB |  |
|  | Display type and size |  |  |
|  | Display resolution |  |  |
|  | Graphics RAM | MB |  |
|  | **Digital Earth Tester** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Earth Resistance Ranges | kΩ |  |
|  | Accuracy | % |  |
|  | Display type |  |  |
|  | **Multi tester (Multimeter)** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Accuracy |  |  |
|  | **Digital Contact Resistance Test set** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Resistance Ranges | µΩ |  |
|  | Accuracy | % |  |
|  | Display type |  |  |

| **Schedule 10: Fire Detection and Protection** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **FIRE DETECTION** |  |  |
|  | Schematic and general arrangement drawings (to be attached) |  |  |
|  | Standards and design codes utilized – (e.g. National Fire Protection Association, NFPA 851 latest edition) | NFPA |  |
|  | Number of zones |  |  |
|  | **Heat Detectors** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number |  |  |
|  | **Smoke Detectors** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number |  |  |
|  | **Ionisation Detectors** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number |  |  |
|  | **Sounders** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Number |  |  |
|  | **FIRE PROTECTION HANDHELD EXTINGUISHERS** |  |  |
|  | General layout /arrangement drawings (to be attached) |  |  |
|  | Standards and design codes utilised |  |  |
|  | Number of zones |  |  |
|  | **CO2 Extinguishers** |  |  |
|  | Number |  |  |
|  | Capacity | kg |  |
|  | Location |  |  |
|  | **Foam Extinguishers** |  |  |
|  | Number |  |  |
|  | Capacity | kg |  |
|  | Location |  |  |
|  | **Water Extinguishers** |  |  |
|  | Number |  |  |
|  | Capacity | kg |  |
|  | Location |  |  |
|  | **Dry Powder Extinguishers** |  |  |
|  | Number |  |  |
|  | Capacity | kg |  |
|  | Location |  |  |

| **Schedule 11: Generator and Associated Equipment** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **GENERATOR** |  |  |
|  | Generator type |  |
|  | Manufacturer |  |
|  | Manufacturer’s designation (machine code) |  |
|  | Number of phases |  |
|  | Rating and performance standard (e.g. IEC 60034) | IEC |
|  | Degree of protection provided by the enclosure (IP code) |  |
|  | Thermal classification |  |
|  | Maximum continuous rating | MW |
|  | Maximum continuous rating | MVA |
|  | Normal minimum continuous generating capacity |  |
|  | Rated voltage | kV |
|  | Rated frequency | Hz |
|  | Rated current | Amps |
|  | Rated speed (for tender) | rpm |
|  | Maximum runaway speed | rpm |
|  | Maximum instantaneous speed | rpm |
|  | Rated field voltage | V |
|  | Rated field current | Amps |
|  | Rated power factor (leading) | pf |
|  | Rated power factor (lagging) | pf |
|  | Maximum ambient temperature | oC |
|  | Maximum water coolant temperature | oC |
|  | Generator flywheel effect (minimum) (GD2) – combined turbine-generator | Kgm2 |
|  | Method of generator neutral earthing |  |  |
|  | **Synchronous Machine Quantities** |  |
|  | Direct-axis synchronous reactance Xd | p.u. |
|  | Short-circuit ratio Kc | p.u. |
|  | Quadrature-axis synchronous reactance Xq | p.u. |
|  | Direct-axis transient reactance X’d | p.u. |
|  | Direct-axis subtransient reactance X’’d | p.u. |
|  | Quadrature-axis subtransient reactance X’’q | p.u. |
|  | Negative-sequence reactance X2 | p.u. |
|  | Zero-sequence reactance X0 | p.u. |
|  | Potier reactance Xp | p.u. |
|  | Direct-axis transient open-circuit time constant τ’do | s |
|  | Direct-axis transient short-circuit time constant τ’d | s |
|  | Direct-axis subtransient short-circuit time constant τ’’d | s |
|  | Armature short-circuit time constant τ’a | s |
|  | Acceleration time τ’j | s |
|  | Stored energy constant H | s |
|  | **Efficiency and Losses (at maximum continuous output, at rated pf and voltage)** |  |
|  | Total losses (including bearing losses) | kW |
|  | Efficiency at maximum continuous output, rated power factor | % |
|  | No Load Losses |  |
|  | 1. Iron Loss | kW |  |
|  | 1. Friction Losses, | kW |  |
|  | 1. Windage Loss | kW |
|  | Load Losses: |  |
|  | 1. Stator copper loss at 75oC | kW |
|  | 1. Field winding copper loss at 75oC | kW |
|  | 1. Eddy current loss | kW |
|  | 1. Excitation supply losses | kW |
|  | 1. Miscellaneous losses | kW |
|  | **Maximum Temperatures and Temperature Rise** |  |
|  | Maximum temperature rise of stator windings | oC |
|  | Maximum temperature rise of rotor windings | oC |
|  | Maximum air outlet temperature (before water cooler) | oC |
|  | Temperature sensor/indicator |  |
|  | **STATOR CORE** |  |
|  | Number of parts (i.e. continuously stacked core without joints) | No. |
|  | Core inside diameter | mm |
|  | Core outside diameter | mm |
|  | Core length | mm |
|  | Number of slots | No. |
|  | Core lamination plate thickness | mm |
|  | Core flux density | Tesla |
|  | Core lamination loss at above flux density | Watts/kg |
|  | Lamination insulation material |  |
|  | Thickness of core lamination insulation | mm |
|  | **STATOR WINDING** |  |  |
|  | Conductors per slot | No. |
|  | Parallel paths per phase | No. |
|  | Cross-sectional area of conductor | mm2 |
|  | Current density in conductor | A/mm2 |
|  | Winding resistance per phase (75oC) | Ω |
|  | Winding capacitance to earth, per phase | μF |
|  | Manufacturer’s name of winding insulation system |  |
|  | Insulation material on end-windings |  |
|  | **ROTOR** |  |
|  | Rotor rim diameter | mm |
|  | Rotor diameter | mm |
|  | Air gap at centre of pole | mm |
|  | Number of poles | No. |
|  | Method of fixing pole to rim |  |
|  | Number of turns per pole | No. |
|  | Dimensions of rotor winding conductor (width x length) | mm |
|  | Winding resistance at 75oC | Ω |
|  | Number of damping winding bars per pole | No. |
|  | Cross-sectional area of each damper bar | mm2 |
|  | Cross-sectional area of pole-to-pole connectors | mm2 |
|  | **BEARINGS** |  |
|  | Thrust bearing location |  |
|  | Thrust bearing type |  |  |
|  | Number of thrust bearing pads | No. |
|  | Guide bearing location |  |
|  | Number of guide bearing pads | No. |
|  | **ESTIMATED WEIGHTS OF GENERATOR PARTS** |  |
|  | Generator stator complete | kg |
|  | Generator rotor and shaft | kg |
|  | Heaviest lift by station crane | kg |
|  | **STATIC EXCITATION EQUIPMENT** |  |
|  | Manufacturer |  |
|  | Manufacturer’s designation / type |  |
|  | Rated voltage | V |
|  | Rated current | A |
|  | No-load voltage | V |
|  | No-load current | A |
|  | Ceiling voltage for 10 seconds | V |
|  | Ceiling Current for 30 seconds | A |
|  | Power system stabiliser |  |
|  | **Excitation Transformer** |  |
|  | Manufacturer |  |
|  | Transformer rating | kVA |
|  | Transformer type |  |
|  | No-load voltage ratio |  |
|  | **Thyristor Cubicle(s)** |  |
|  | Number of thyristor cubicles | No. |
|  | Total number of thyristors | No. |  |
|  | Number of bridge arms | No. |
|  | Number of thyristors in series per arm | No. |
|  | Number of series strings in parallel | No. |
|  | Thyristor equipment continuous current rating | A |
|  | Thyristor equipment continuous voltage rating | V |
|  | Thyristor equipment 5 second current rating | A |
|  | Thyristor equipment maximum voltage rating | V |
|  | Loss (heat) dissipated in each cubicle at MCR | kW |
|  | Number of cooling fans per cubicle | No. |
|  | Cooling air flow | m3/s |
|  | **Thyristors** |  |
|  | Thyristor recommended maximum case temperature | oC |
|  | Thyristor case temperature at MCR | oC |
|  | Thyristor current at MCR | A |
|  | Thyristor voltage at MCR | V |
|  | Current rating of H.R.C. fuses | A |
|  | **Automatic Voltage Regulator** |  |
|  | Manufacturer |  |
|  | Manufacturer’s designation |  |
|  | Type |  |
|  | Maximum voltage rise immediately following a generator trip whilst generating at MCR at rated pf | % |
|  |  |  |  |

| **Schedule 12: Generator Circuit Breaker** | | | |
| --- | --- | --- | --- |
| **ITEM NO.** | **DESCRIPTION** | **UNIT** | **BIDDERS OFFER** |
|  | INSTRUMENT TRANSFORMER (CT & VT) |  |  |
|  | Type |  |
|  | Manufacturer |  |
|  | Rated nominal voltage | kV, ms |
|  | Rated steady state maximum voltage | kV, ms |
|  | Rated continuous overvoltage | kV, ms |
|  | Rated frequency | Hz |
|  | Rated primary current | A, ms |
|  | Rated secondary current | A, ms |
|  | Rated transformation ratios |  |
|  | Rated output | VA |
|  | Number of secondary cores and windings |  |
|  | Accuracy Class |  |
|  | Accuracy limit factor |  |
|  | Instrument security factor |  |
|  | Short time current rating: |  |
|  | (a) Thermal | kA |
|  | (b) Dynamic | kA |
|  | Rated lightning impulse withstand voltage | kV, peak |
|  | Rated switching impulse withstand voltage | kV, peak |

| **Schedule 13: Excitation Transformer** | | | | |
| --- | --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidder’s Offer** |  |
|  |  |  |  |  |
|  | **EXCITATION TRANSFORMER** |  |  |  |
|  | Manufacturer’s Name |  |  |  |
|  | Manufacturer’s Type Designation |  |  |  |
|  | Specification to which the transformer shall comply |  |  |  |
|  | Type of transformer |  |  |  |
|  | Single or three-phase unit |  |  |  |
|  | Frequency of supply | Hz |  |  |
|  | Dry type |  |  |  |
|  | Indoor or outdoor type |  |  |  |
|  | Type of cooling |  |  |  |
|  | Continuous maximum rating (at site) | MVA |  |  |
|  | Rated Voltage – high voltage winding | kV |  |  |
|  | Rated Voltage – low voltage winding | kV |  |  |
|  | Highest voltage for equipment HV winding | kV |  |  |
|  | Highest voltage for equipment LV winding | kV |  |  |
|  | No. of transformers of this size | No. |  |  |
|  | Method of system earthing for HV winding |  |  |  |
|  | Method of system earthing for LV winding |  |  |  |
|  | HV winding - rated lightning impulse withstand voltage | kV |  |  |
|  | HV winding - rated short duration AC withstand voltage | kV |  |  |
|  | LV winding - rated lightning impulse withstand voltage | kV |  |  |
|  | LV winding - rated short duration AC withstand voltage | kV |  |  |
|  |  |
|  | HV winding phase connection |  |  |  |
|  | LV winding connection |  |  |  |
|  | Vector Group |  |  |  |
|  | Maximum flux density at nominal frequency, voltage and ratio. | T |  |  |
|  | Auxiliary supply voltage |  |  |  |
|  | Impedance voltage at CMR, nominal ratio, 75oC |  |  |  |
|  | Maximum winding hot spot temperature under site conditions | oC |  |  |
|  | Maximum winding temperature rise | oC |  |  |
|  | Maximum oil temperature under site conditions | oC |  |  |
|  | Total losses at nominal ratio, 75oC | kW |  |  |
|  | No load loss at nominal tap and frequency | kW |  |  |
|  | Load loss at rated current, 75oC: |  |  |  |
|  | Sound level | dB(A) |  |  |

| **Schedule 14: Power and Auxiliary Transformers** | | | | |
| --- | --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Power Transformer**  **(Bidders Offer)** | **Auxiliary Transformer**  **(Bidders Offer)** |
|  |  |  |  |  |
|  | **POWER TRANSFORMER** |  |  |  |
|  | Type of transformer |  |  |  |
|  | Manufacturer’s Name |  |  |  |
|  | Specification to which the transformer shall comply |  |  |  |
|  | Single or three-phase unit |  |  |  |
|  | Frequency of supply | Hz |  |  |
|  | Oil immersed type |  |  |  |
|  | Indoor/Outdoor type |  |  |  |
|  | Type of cooling |  |  |  |
|  | Continuous maximum rating (at site) | kVA |  |  |
|  | Rated Voltage – high voltage winding | kV |  |  |
|  | Rated Voltage – low voltage winding | kV |  |  |
|  | Highest voltage for equipment HV winding | kV |  |  |
|  | Highest voltage for equipment LV winding | kV |  |  |
|  | No. of transformers of this size | No. |  |  |
|  | Method of system earthing for HV winding |  |  |  |
|  | Method of system earthing for LV winding |  |  |  |
|  | HV winding - rated lightning impulse withstand voltage | kV |  |  |
|  | HV winding - rated short duration AC withstand voltage | kV |  |  |
|  | LV winding - rated lightning impulse withstand voltage | kV |  |  |
|  | LV winding - rated short duration AC withstand voltage | kV |  |  |
|  |  |
|  | HV winding phase connection |  |  |  |
|  | LV winding connection |  |  |  |
|  | Vector Group |  |  |  |
|  | Maximum flux density at nominal frequency, voltage and ratio. | T |  |  |
|  | Auxiliary supply voltage |  |  |  |
|  | Impedance voltage at CMR, nominal ratio, 75oC |  |  |  |
|  | Maximum winding hot spot temperature under site conditions | oC |  |  |
|  | Maximum winding temperature rise | oC |  |  |
|  | Maximum oil temperature under site conditions | oC |  |  |
|  | Maximum oil temperature rise | oC |  |  |
|  | Total losses at nominal ratio, 75oC | kW |  |  |
|  | No load loss at nominal tap and frequency | kW |  |  |
|  | Load loss at rated current, 75oC: |  |  |  |
|  | Sound level | dB(A) |  |  |
|  | **Conservator** |  |  |  |
|  | Ventilation method |  |  |  |
|  | Type of breather |  |  |  |
|  | Oil level gauge fitted |  |  |  |
|  | **Arcing Horns** |  |  |  |
|  | arcing horns provided |  |  |  |
|  | **HV Line Bushings** |  |  |  |
|  | Creepage distance | mm |  |  |
|  | Continuous current rating | A |  |  |
|  | Short time current rating (1 sec) | A |  |  |
|  | Short time current rating (3 sec) | A |  |  |
|  | **HV Neutral Bushings** |  |  |  |
|  | Creepage distance | mm |  |  |
|  | Continuous current rating | A |  |  |
|  | Short time current rating (1 sec) | A |  |  |
|  | Short time current rating (3 sec) | A |  |  |
|  | **Buchholz Relay** |  |  |  |
|  | Manufacturer |  |  |  |
|  | Number of alarm contacts |  |  |  |
|  | Number of trip contacts |  |  |  |
|  | **Winding temperature sensor/indicator** |  |  |  |
|  | Manufacturer |  |  |  |
|  | Number of alarm contacts |  |  |  |
|  | Number of trip contacts |  |  |  |
|  | **Oil temperature sensor/indicator** |  |  |  |
|  | Manufacturer |  |  |  |
|  | Number of alarm contacts |  |  |  |
|  | Number of trip contacts |  |  |  |
|  | **Transformer Tank** |  |  |  |
|  | Thickness of tank sides | mm |  |  |
|  | Thickness of tank bottom | mm |  |  |
|  | Tank size (l x w x h) | m |  |  |
|  | **Core** |  |  |  |
|  | Type of insulation of laminations |  |  |  |
|  | Type of insulation of core bolts |  |  |  |
|  | **Winding** |  |  |  |
|  | Type of HV winding |  |  |  |
|  | Type of LV winding |  |  |  |
|  | Type of insulation of HV winding |  |  |  |
|  | Type of insulation of LV winding |  |  |  |
|  | **Oil** |  |  |  |
|  | Type of oil |  |  |  |
|  | Total oil quantity (operating) | litres |  |  |
|  | Transformer tank oil quantity | litres |  |  |
|  | Conservator oil quantity | litres |  |  |
|  | Tap changer compartment oil quantity | litres |  |  |
|  | **Weights** |  |  |  |
|  | Weight of fully assembled transformer | kg |  |  |
|  | Weight of oil in fully assembled transformer | kg |  |  |
|  | Total weight of core and windings | kg |  |  |
|  | Shipping weight of partially assembled transformer | kg |  |  |
|  | Outline drawing number (drawing to be submitted with Bid) |  |  |  |
|  | Transportation drawing number (drawing to be submitted with Bid) |  |  |  |
|  | **Internal explosion protection fitted?** |  |  |  |

| **Schedule 15: HV Switchyard Equipment** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **OUTDOOR CIRCUIT BREAKER** |  |  |
|  | Manufacturer |  |  |
|  | Type reference (Manufacturer’s designation) |  |  |
|  | Interrupting medium |  |  |
|  | Number of phases | No. |  |
|  | Frequency | Hz |  |
|  | Rated Voltage | kV |  |
|  | Lighting impulse withstand voltage | kV |  |
|  | Power frequency withstand voltage | kV |  |
|  | Rated normal current | A |  |
|  | Short-time withstand current |  |  |
|  | 1. 1 second | kA |  |
|  | 1. 3 seconds | kA |  |
|  | Rated short-circuit breaking currents: |  |  |
|  | 1. Three-phase symmetrical | kA |  |
|  | 1. Three-phase asymmetrical | kA |  |
|  | 1. DC component as percentage of (a) | % |  |
|  | 1. Single phase | kA |  |
|  | Testing Authority |  |  |
|  | Test Certificate Report - references |  |  |
|  | Short-circuit making current | kA |  |
|  | Rated operating duty cycle |  |  |
|  | Nominal overall diameter | mm |  |
|  | First phase to clear factor |  |  |
|  | Rated transient recovery voltage at 100% | kV |  |
|  | Opening time (BS EN 62271/IEC 62271) | ms |  |
|  | Closing time (BS EN 62271/IEC 62271) | ms |  |
|  | Is any external series break incorporated in the breaker? |  |  |
|  | Is any device used to limit transient recovery voltage? |  |  |
|  | Method of closing |  |  |
|  | Method of tripping |  |  |
|  | Solenoid closing coil current | A |  |
|  | Solenoid closing coil voltage | A |  |
|  | Rated voltage for spring winding motor for closing | V |  |
|  | Spring winding motor current (normal) | A |  |
|  | Closing release coil current | A |  |
|  | Closing release coil voltage | V |  |
|  | Trip coil current | A |  |
|  | Trip coil voltage | V |  |
|  | Is the circuit-breaker trip free? |  |  |
|  | Minimum clearance in air: |  |  |
|  | 1. between phases | mm |  |
|  | 1. phases to earth | mm |  |
|  | 1. across interrupters | mm |  |
|  | 1. live parts to ground level | mm |  |
|  | Material of tank interrupter chamber |  |  |
|  | Material of moving contact operating rod |  |  |
|  | Material of contact surfaces |  |  |
|  | Number of breaks per phase | No. |  |
|  | Length of each break | mm |  |
|  | Length of stroke | mm |  |
|  | Weight of circuit-breaker unit complete | kg |  |
|  | Maximum shock load imposed on floor or foundations when opening under fault conditions (state whether tension or compression) (per pole) | kg |  |
|  | Period of time equipment has been in commercial operation | yrs |  |
|  | Number of operations before interrupter maintenance required: |  |  |
|  | a) At rated short circuit current | No. |  |
|  | b) At full load current | No. |  |
|  | **DISCONNECTORS AND EARTHING SWITCHES** |  |  |
|  | Manufacturer |  |  |
|  | Type |  |  |
|  | Type of contacts |  |  |
|  | Material of contact surface |  |  |
|  | Normal rated currents | A |  |
|  | Air gap between poles of one phase | mm |  |
|  | Type of operating mechanism |  |  |
|  | Total weight of three-phase disconnector complete | kg |  |
|  | Operating time | s |  |
|  | Impulse withstand voltage: |  |  |
|  | 1. To earth | kV |  |
|  | 1. Across isolating distance | kV |  |
|  | **CURRENT TRANSFORMERS** |  |  |
|  | Manufacturer |  |  |
|  | Type designation |  |  |
|  | Type of primary winding (e.g. bar, wound, etc.) |  |  |
|  | Type of insulation |  |  |
|  | Impulse withstand voltage | kV |  |
|  | Power frequency withstand voltage | kV rms |  |
|  | Continuous primary current overload capacity | % |  |
|  | Ratio |  |  |
|  | Class |  |  |
|  | Burden | VA |  |
|  | Circuit designation |  |  |
|  | **VOLTAGE TRANSFORMERS** |  |  |
|  | Manufacturer |  |  |
|  | Type designation |  |  |
|  | Type of insulation |  |  |
|  | Impulse withstand voltage | kV |  |
|  | Power frequency withstand voltage | kV rms |  |
|  | Are fuses fitted? |  |  |
|  | 1. Primary winding |  |  |
|  | 1. Secondary winding |  |  |
|  | Ratio |  |  |
|  | Class |  |  |
|  | Burden | VA |  |
|  | Circuit designation |  |  |
|  | **SURGE ARRESTORS** |  |  |
|  | System highest voltage | kV |  |
|  | Insulation levels of protected systems: |  |  |
|  | 1. Switchgear | kV |  |
|  | 1. Transformers 2. Cables/Conductors | kV |  |
|  | Manufacturer and Type No. |  |  |
|  | Class of diverter to IEC.60099-4 (BS EN 60099-4): |  |  |
|  | 1. Duty |  |  |
|  | 1. Long duration discharge |  |  |
|  | 1. Pressure relief class |  |  |
|  | Rated voltage | kV rms |  |
|  | Rated nominal discharge current | kA |  |
|  | Number of separate units per arrester | No. |  |
|  | Discharge residual voltage based on 8/20 µs wave at: |  |  |
|  | 1. 5kA | kV peak |  |
|  | 1. 10kA | kV peak |  |
|  | 1. 20kA | kV peak |  |
|  | Power frequency voltage capability for: |  |  |
|  | 1. 1 sec | kV rms |  |
|  | 1. 3 sec | kV rms |  |
|  | 1. Continuous | kV rms |  |
|  | Switching impulse residual voltage, 1000A | kV rms |  |
|  | 30/60 µs wave | kV |  |
|  | Total height of arrester | mm |  |
|  | Total weight of arrester | kg |  |
|  | Type reference of surge monitor |  |  |
|  | Minimum creepage distance: |  |  |
|  | 1. Specified | mm |  |
|  | 1. Guaranteed | mm |  |
|  | **CONNECTIONS** |  |  |
|  | Manufacturer |  |  |
|  | Material |  |  |
|  | Overall diameter | mm |  |
|  | Nominal section | mm2 |  |
|  | Cross section and make up | mm2 |  |
|  | Maximum rated current | A |  |
|  | Maximum working tension of main connections | kN/m2 |  |
|  | Resistance of conductors per 100 m at 30°C | Ω |  |
|  | Tensile breaking stress of material | kN/mm2 |  |
|  | Maximum permissible span length | m |  |
|  | Maximum sag under own weight of maximum span | mm |  |
|  | Protected creepage distance per unit | mm |  |
|  | **INSULATOR STRINGS** |  |  |
|  | Manufacturer |  |  |
|  | Insulator type and manufacturer’s reference |  |  |
|  | Number of units per string | No. |  |
|  | Outside diameters of units | mm |  |
|  | Distance between centres of units | mm |  |
|  | Overall lengths of strings | mm |  |
|  | Maximum working load per unit | kN |  |
|  | Minimum failing load per unit | kN |  |
|  | Minimum failing load (bending) | kN |  |
|  | Electro-mechanical failing load | kN |  |
|  | Mechanical failing load | kN |  |
|  | Electrostatic capacitance of unit | pF |  |
|  | Weight of complete string | kg |  |
|  | 50 Hz 1 minute withstand voltage of unit, dry | kV |  |
|  | 50 Hz 1 minute withstand voltage of unit, wet | kV |  |
|  | Minimum 50 Hz puncture voltage | kV |  |
|  | lightening impulse withstand voltage of string 1.2/50 µs wave | kV |  |
|  | Minimum creepage distance per unit: |  |  |
|  | 1. Specified, subject to acceptable shed profile | mm |  |
|  | 1. Guaranteed | mm |  |
|  | Protected creepage distance per unit | mm |  |
|  | **INSULATORS** |  |  |
|  | Manufacturer |  |  |
|  | IEC 60168 reference |  |  |
|  | Function of insulator |  |  |
|  | Rated service voltage | kV |  |
|  | Principal insulating materials |  |  |
|  | Overall length of insulator | mm |  |
|  | Shed profile (drawing to be enclosed with Tender) | Drg.No. |  |
|  | Weight of insulator complete with fittings | kg |  |
|  | Electrostatic capacitance | pF |  |
|  | Material of fittings |  |  |
|  | Total creepage distance externally: |  |  |
|  | 1. Specified, subject to acceptable shed profile | mm |  |
|  | 1. Guaranteed | mm |  |
|  | Protected creepage distance | mm |  |
|  | Lightening impulse withstand voltage (1.2/50 µs wave) | kV |  |
|  | Switching impulse withstand voltage wet | kV |  |

| **Schedule 16: Control and Monitoring System** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Particulars** |
|  | **UNIT LOCAL CONTROL BOARD** |  |  |
|  | Manufacturer |  |  |
|  | Manufacturer’s general arrangement drawing number (drawing to be submitted with tender) | Drg. No. |  |
|  | Manufacturer’s schematic drawing number (drawing to be submitted with tender) | Drg. No. |  |
|  | IP protection classification of the board |  |  |
|  | Overall dimensions of board (l x w x h) | mm |  |
|  | **SUBSTATION CONTROL BOARD** |  |  |
|  | Manufacturer |  |  |
|  | Manufacturer’s general arrangement drawing number (drawing to be submitted with tender) | Drg. No. |  |
|  | Manufacturer’s schematic drawing number (drawing to be submitted with tender) | Drg. No. |  |
|  | IP protection classification of the board |  |  |
|  | Overall dimensions of board (l x w x h) | mm |  |
|  | **PLC** |  |  |
|  | PLC manufacturer |  |  |
|  | Type reference |  |  |
|  | Product description provided? |  |  |
|  | Time of proven service | years |  |
|  | Processor redundancy |  |  |
|  | Power supply type |  |  |
|  | Power supply redundancy |  |  |
|  | I/O module type reference |  |  |
|  | Estimated number of I/O points required | No. |  |
|  | Number of I/O points provided | No. |  |
|  | Number of I/O points capacity | No. |  |
|  | Type of HMI |  |  |
|  | Type of display |  |  |
|  | Manufacturer of display |  |  |
|  | Size of display (w x h) | mm |  |
|  | Resolution of display |  |  |
|  | Communications module type reference |  |  |
|  | Estimated number of communications channels required | No. |  |
|  | Number of communications channels provided | No. |  |
|  | Communications channels capacity |  |  |
|  | PLC software |  |  |
|  | HMI software |  |  |
|  | Time for a complete VDU display to be presented following an operator request | sec |  |
|  | Time delay for analogue update following input signal change | sec |  |
|  | Time delay for digital update following input signal change | sec |  |
|  | Time delay for output command following an operator request | sec |  |
|  | Time delay for alarm display following input signal change | sec |  |
|  | Time delay for alarm display following multiple input signal change (i.e. system response dependent on system loading) | sec |  |
|  | Processor MTBF |  |  |
|  | Power supply MTBF |  |  |
|  | I/O module MTBF |  |  |
|  | Communications module MTBF |  |  |
|  | HMI MTBF |  |  |
|  | Complete system MTBF |  |  |
|  | Instrument manufacturer |  |  |
|  | Dimensions of panel (l x w x h) |  |  |
|  | Protection class of panel (IP rating) |  |  |
|  |  |  |  |

| **Schedule 17: Protection and Metering Equipment** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Particulars** |
|  | **PROTECTION EQUIPMENT** |  |  |
|  | **Unit Protection Panels** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Manufacturer’s general arrangement drawing number (drawing to be submitted with tender) | Drg. No. |  |
|  | Protection Class of panels (IP rating) |  |  |
|  | Number of panels | No. |  |
|  | Rear access required | Yes/No |  |
|  | Dimensions of panel (l x w x h) | mm |  |
|  | **Power and Auxiliary Transformer Protection Relays** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Ranges (datasheets and brochures to be submitted with tender) |  |  |
|  | **Substation 11 kV Protection Panels** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Manufacturer’s general arrangement drawing number (drawing to be submitted with tender) | Drg. No. |  |
|  | Protection Class of panels (IP rating) |  |  |
|  | Number of panels | No. |  |
|  | Rear access required | Yes/No |  |
|  | Dimensions of panel (l x w x h) | mm |  |
|  | **METERING EQUIPMENT** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Manufacturer’s general arrangement drawing number (drawing to be submitted with tender) |  |  |
|  | Protection Class of panels (IP rating) |  |  |
|  | Number of panels | No. |  |
|  | Rear access required | Yes/No |  |
|  | Dimensions of panel (l x w x h) | m |  |
|  |  |  |  |

| **Schedule 18: AC Auxiliary Power System** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **400 V SWITCHBOARDS** |  |  |
|  | Panel manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Rated voltage | V |  |
|  | Power frequency withstand | kV |  |
|  | Lightening impulse withstand | kV |  |
|  | Neutral earthing system |  |  |
|  | Seismic acceleration withstand (h & v) | g |  |
|  | Busbar continuous rating | A |  |
|  | Ambient temperature for rating | °C |  |
|  | Busbar insulation material |  |  |
|  | Short time current withstand | kA, s |  |
|  | Internal arc withstand 1 second | kA |  |
|  | Internal arc withstand 0.15 second | kA |  |
|  | Enclosure protection | IP |  |
|  | Compartment protection | IP |  |
|  | Height | m |  |
|  | Rear access required | Yes/No |  |
|  | **400V CIRCUIT BREAKERS** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (datasheets and brochures to be attached) |  |  |
|  | Breaking capacity: |  |  |
|  | * 1. Symmetrical | kA rms |  |
|  | * 1. Asymmetrical | kA rms |  |
|  | Making capacity | kA peak |  |
|  | Short time current | kA |  |
|  | Duration of short time current | s |  |
|  | Method of arc extinction |  |  |

| **Schedule 19: DC Systems and UPS** | | | | |
| --- | --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **110/220 V**  **(Bidders Offer)** | **48 V**  **(Bidders Offer)** |
|  | CHARGERS |  |  |  |
|  | Charger manufacturer |  |  |  |
|  | Place of manufacture, inspection and testing |  |  |  |
|  | Type reference (datasheets and brochures to be submitted with tender) |  |  |  |
|  | Manufacturer’s general arrangement drawing number (to be submitted with tender) | Drg. No. |  |  |
|  | Number of units |  |  |  |
|  | Seismic acceleration withstand (h & v) | g |  |  |
|  | Rated A.C. voltage | V |  |  |
|  | Rated D.C. voltage | V |  |  |
|  | Type of cooling |  |  |  |
|  | Rated input at full load | VA |  |  |
|  | D.C. output of charger | kW |  |  |
|  | Rated D.C. current at 40°C | A |  |  |
|  | Current limitation | A |  |  |
|  | Type of load voltage control |  |  |  |
|  | Range of load voltage control | % |  |  |
|  | Regulation | % |  |  |
|  | Adjustable D.C. voltage for: |  |  |  |
|  | 1. float charging | V/cell |  |  |
|  | 1. boost charging | V/cell |  |  |
|  | Ripple value | % |  |  |
|  | Protection class of charger cubicle | IP |  |  |
|  |  |  |  |  |
|  | D.C. DISTRIBUTION PANELS |  |  |  |
|  | Panel manufacturer |  |  |  |
|  | Place of manufacture, inspection and testing |  |  |  |
|  | Type reference (datasheets and brochures to be submitted with tender) |  |  |  |
|  | Highest voltage for equipment | V |  |  |
|  | Busbar rating at 40°C | A |  |  |
|  | Fault withstand current (1s) | kA |  |  |
|  | Protection class of distribution switchboard | IP |  |  |
|  | UNINTERRUPTIBLE POWER SUPPLY |  |  |  |
|  | Manufacturer |  |  |  |
|  | Rating | Ah |  |  |
|  | Input current (110/220 Vd.c.) | A |  |  |
|  | Output current (230 V a.c.) | A |  |  |
|  | Power factor |  |  |  |
|  | Dimensions (lxwxh) | m |  |  |
|  | Weight | kg |  |  |
|  | Static bypass switch? | Yes/No |  |  |
|  | AC DISTRIBUTION BOARD |  |  |  |
|  | Busbar rating | A |  |  |
|  | Dimensions (lxwxh) | mm |  |  |
|  | Number of busbars and connection ways |  |  |  |
|  | Current rating of outgoing ways | A |  |  |

| **Schedule 20: Cables** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **0.4 kV GENERATOR CABLE** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture, inspection and testing |  |  |
|  | Type reference (provide data sheets) |  |  |
|  | Voltage rating | kV |  |
|  | Number of cores | No. |  |
|  | Conductor material |  |  |
|  | Conductor shape |  |  |
|  | Insulation type |  |  |
|  | Insulation screen type |  |  |
|  | Metallic screen type |  |  |
|  | Bedding sheath type |  |  |
|  | Armouring type and material |  |  |
|  | Oversheath type |  |  |
|  | Sheath flame/smoke properties |  |  |
|  | Fire resistance category |  |  |
|  | For each size of cable to be provided indicate: |  |  |
|  | Cross-sectional area of conductor | mm2 |  |
|  | Minimum average thickness of insulation | mm |  |
|  | Nominal overall diameter of cable | mm |  |
|  | Maximum d.c. resistance (20°C) | μΩ/m |  |
|  | Impedance at 50 Hz | μΩ/m |  |
|  | Sustained current rating laid in ground | A |  |
|  | Sustained current rating in air | A |  |
|  | Short circuit current rating: |  |  |
|  | * 1. 1 sec | kA |  |
|  | * 1. 3sec | kA |  |
|  | Minimum bending radius | mm |  |
|  | **400V AUXILIARY POWER CABLES** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture |  |  |
|  | Type reference |  |  |
|  | Data-sheets provided | Yes/No |  |
|  | **CONTROL & INSTRUMENTATION CABLES** |  |  |
|  | Manufacturer |  |  |
|  | Place of manufacture |  |  |
|  | Type reference |  |  |
|  | Data-sheets provided | Yes/No |  |

| **Schedule 21: Lighting and Power outlets** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Bidders Offer** |
|  | **Powerhouse High Bay Lighting** |  |  |
|  | Luminaire type |  |  |
|  | Luminaire manufacturer |  |  |
|  | Luminaire part reference no. |  |  |
|  | Luminaire luminous flux | lm |  |
|  | Luminaire wattage | W |  |
|  | Brochure enclosed | Yes/No |  |
|  | **General Lighting** |  |  |
|  | For each type of fitting: |  |  |
|  | Luminaire type |  |  |
|  | Luminaire manufacturer |  |  |
|  | Luminaire part reference no. |  |  |
|  | Luminaire luminous flux | lm |  |
|  | Luminaire wattage | W |  |
|  | Brochure enclosed | Yes/No |  |
|  |  |  |  |

| **Schedule 22: Earthing and Lightening Protection** | | | |
| --- | --- | --- | --- |
| **Item No.** | **Description** | **Unit** | **Particulars** |
|  | **Earthing system** |  |  |
|  | Manufacturer |  |  |
|  | Type of earthing rods |  |  |
|  | 1. Diameter | mm |  |
|  | 1. Length | m |  |
|  | Type of connection to earth rod/grid |  |  |
|  | Conductors laid in ground |  |  |
|  | Solid copper conductor | mm2 |  |
|  | Stranded copper conductor | mm2 |  |
|  | 1. Stranding | No/mm ø |  |
|  | Inspection pit |  |  |
|  | Thermic welded joints |  |  |
|  | Earth bar |  |  |
|  | Maximum earthing resistance at any point of the grid | ohm |  |
|  | **Lightening protection** |  |  |
|  | Manufacturer |  |  |
|  | Type of earthing rods |  |  |
|  | Lightning air terminal |  |  |
|  | 1. number |  |  |
|  | 1. type |  |  |
|  | Cross section of down conductor | mm2 |  |
|  | Material of down conductor |  |  |
|  | Maximum earthing resistance if disconnected from general earthing grid | ohm |  |

| **Schedule 23: Paint & Surface Protection** | | |
| --- | --- | --- |
| The painting and protection system and the finish proposed for different materials and items of equipment shall be detailed. Information to be provided shall include the following:   * methods of preparation, application and inspection; * sequences and intervals of all procedures; * standards to which procedures or products conform; * precautions and restrictions to be observed; and * methods of protection of factory applied coatings during transport to Site. | | |
| **Item No.** | **Description** | **BIDDERS OFFER** |
|  | **Structural Steelwork** |  |
|  | Internal |  |
|  | External |  |
|  | **Miscellaneous Steelwork** |  |
|  | Internal |  |
|  | External |  |
|  | **Large Diameter Pipework (Penstock) and Associated Embedments** |  |
|  | Internal |  |
|  | External |  |
|  | **Gates, Screens** |  |
|  | External |  |
|  | **Mechanical Plant** |  |
|  | Internal |  |
|  | External |  |
|  |  |  |
|  |  |  |
|  | **Electrical Plant** |  |
|  | Internal |  |
|  | External |  |
|  | **Control Boards, Panel Boards and Cubicles** |  |
|  | Internal |  |
|  | External |  |
|  | **Pipework & Services** |  |
|  | Internal |  |
|  | External |  |
|  | **Timber** |  |
|  | Internal |  |
|  | External |  |
|  | **Cementitious Surfaces** |  |
|  | Concrete floor |  |
|  | Concrete walls |  |
|  | External Masonry/Render |  |
|  | Internal Masonry/Render |  |
|  | Plaster |  |
|  |  |  |

**Functional Guarantees**

**Form FUNC**

**Schedule of Guarantees**

These completed Schedule of Guarantees will be used to calculate any non-performance damages due under the Contract.

## **Overall Station Output Guarantee**

Overall Station performance shall be determined at the station total design flow rate of 0.68 m3/s and as measured as electrical power output at the generator terminals.

Depending on the time of the year, the river flow may not be sufficient to carry out tests during commissioning at the maximum output. Under such conditions, it will be necessary to **perform tests after completion** in accordance with General Conditions of Contract Clause 12.

In order to determine the sufficiency of the Facilities for taking over, the tests under low river flow conditions shall meet the guaranteed values provided by the Bidder in the Schedule 1 table below. Outputs for river flows between the indicated river flows shall be taken pro rata. Tests on completion shall not be carried out when the flow is less than minimum flow as per manufactures’ recommendation.

|  |  |
| --- | --- |
| **Schedule 1 - Overall Station Output Guarantee** | |
| The Contractor guarantees that the maximum continuous output of the overall station shall not be less than the value stated below: | |
| **Canal Intake Flow Rate – m3/s** | **Guaranteed Value - kW** |
| 100% of design flow rate | …….. kW |
| 85% of design flow rate | …….. kW |
| 70% of design flow rate | …….. kW |
| 60% of design flow rate | …….. kW |
| 50% of design flow rate | …….. kW |
| Guaranteed maximum continuous output of the overall station, under the following conditions:   1. Output measured at the generator terminals 2. Rated Net head 3. Power factor 0.85 lagging 4. Voltage range 95 – 105% 5. Temperature rise not to exceed class B temperature rise according IEC 60034-1   Note: The guaranteed output at canal intake flow rate of 0.68 m3/s shall be not less than 200.0 kW |  |

**Turbine Generator Unit Guarantees**

|  |  |
| --- | --- |
| **Schedule 2 - Turbine Generator Unit Output Guarantee** | |
| The Contractor guarantees that the continuous rating of the turbine generator units shall not be less than the value stated below:: | |
|  | **Guaranteed Value** |
| Guaranteed maximum continuous rating of the turbine generator units measured at the generator terminals, under the following conditions:   1. Rated Net head 2. Discharge 0.68 m3/s 3. At rated power factor = 0.85 4. Voltage range 95 – 105% 5. Temperature rise not to exceed class B temperature rise according IEC 60034-1 6. Measured at the generator terminals.   Note: The guaranteed output shall be not less than 200 kW. | ……………….kW |

|  |  |
| --- | --- |
| **Schedule 3 - Turbine & Generator Efficiency Guarantee** | |
| The Contractor guarantees that the combined turbine and generator maximum efficiency shall not be less than the value stated below: | |
|  | **Guaranteed Value** |
| Guaranteed maximum efficiency of the turbine and generator unit, under the following conditions:   1. Rated Net head 2. Generator outputs between 200 kW and the Guaranteed Value in Schedule 2 above 3. At rated power factor 4. Measured at the generator terminals.   Note:   * The guaranteed overall combined turbine and generator efficiency shall be not less than 90.0%. * The overall uncertainty of measurement shall not be greater than 2%. * Testing shall be conducted in accordance BS EN 60041. | ………………% |

|  |  |
| --- | --- |
| **Schedule 4 - Turbine Speed and Pressure Rise Guarantee** | |
| The Contractor guarantees that the maximum speed and pressure rise of the turbine shall not exceed the values stated below: | |
|  | **Guaranteed Value** |
| Guaranteed turbine / generator maximum speed and pressure rise, under the following full load rejection conditions of:   1. Generator 1 output at the Guaranteed Value in Schedule 2 above 2. Generator 2 output at the Guaranteed Value in Schedule 2 above 3. At rated net head   Note: The guaranteed values shall not exceed 45% for speed rise and 10% for pressure rise. Testing shall be conducted generally in accordance with BS EN 60041. | …….% (speed)  …….% (speed)  …….% (pressure) |

|  |  |
| --- | --- |
| **Schedule 5 - Turbine Cavitation Guarantee** | |
| The Contractor guarantees that the loss of metal through cavitation for the turbine unit shall not exceed the values stated below: | |
|  | **Guaranteed Value** |
| Guaranteed maximum removal of metal from the blades in accordance with BS IEC 60609-2 (Vmax)  Guaranteed maximum depth of pitting of the blades in accordance with BS IEC 60609-2 (Smax)  The above cavitation guarantees shall apply under the following conditions:   1. Time period for which the guarantees shall apply is 16,000 operation hours or two years’ service whichever comes first. 2. The guarantee shall be valid provided the turbine shall have been operated for less than 10% of the operating hours at a turbine generator output of less than the ‘Minimum continuous rated output of the turbine unit’ as stated in Part 1, Section IV, Schedule 4, item 4.10 | ………………cm3  ………………cm |

## **Power Transformer Guarantees**

|  |  |
| --- | --- |
| **Schedule 6 - Power Transformer Output Guarantee** | |
| The Contractor guarantees that the continuous rating of the power transformer shall not be less than the value stated below: | |
|  | **Guaranteed Value** |
| Rated power  Note: The rated kVA output shall be measured on the Transformer during the acceptance tests to be performed at the manufacturer’s Works in the presence of the Project Manager.  Note: The guaranteed output shall be not less than 250 kVA. | …………………kVA |

|  |  |
| --- | --- |
| **Schedule 7 - Power Transformer Losses Guarantee** | |
| The Contractor guarantees that the losses of the generator transformer shall not be greater than the values stated below: | |
|  | **Guaranteed Value** |
| No load loss at rated voltage, ratio and frequency (excluding cooling plant losses)  Load loss at 75oC, nominal ratio and maximum continuous rating  The no-load losses and load losses shall be measured on the Transformer during the acceptance tests to be performed at the manufacturer’s Works in the presence of the Employer. | …………………kW  …………………kW |

This information is declared to be correct by (Bidder’s authorised representative)

Name………………………………………… Signature………………

Position in the Firm…………………………………… Date………………………

Note: Any deviation on site from the minimum Functional Guaranteed values shall cause UNDP to impose liquidated damages (as non-performance damages) on the contractor (the deviation percentages and corresponding values of liquidated damages are shown below :

Failure in Guarantees and Liquidated Damages

## **3.1 Overall Station Output Guarantee**

Damages will be calculated for the overall station output taking into account the respective tolerances of accuracy. If the Facility fails to pass the test outputs by more than 3% below the guaranteed values then Liquidated Damages will not apply and the remedies as provided in Sub-Clause 28.2 of the Conditions of Contract will be exercised.

The Contract Price will be reduced by USD 25,000 for each 10kW of output below the required guaranteed output at the canal intake flow rate of 0.68 m3/s. The figure above is based on the Employer’s energy model at midrate tariff and discount value over the 50 year expected life of the station.

## **3.2 Turbine Generator Unit Guarantees**

**3.2.2 Turbine and Generator Output Guarantee**

Damages will be calculated for the turbine-generator unit, taking into account the respective tolerances for accuracy.

The Contract Price will be reduced by USD 25,000 for each full 10kW of output that the measured turbine-generator is less than the maximum guaranteed output. The figure above is based on the Employer’s energy model at midrate tariff and discount value over the 50 year expected life of the station.

**3.2.3 Turbine and Generator Efficiency Guarantee**

Damages will be calculated for each of the turbine-generator units, taking into account the respective tolerances for accuracy.

The Contract Price will be reduced by USD 20,000 for each 0.05% that the measured turbine-generator unit efficiency (for any one unit) is less than the guaranteed output. The figure above is based on the Employer’s energy model at midrate tariff and discount value over the 50 year expected life of the station.

**3.2.4 Turbine and Generator Speed and Pressure Rise Guarantee**

Liquidated Damages will not apply and the remedies as provided the relevant Conditions of Contract will be exercised.

## **3.3 Turbine Cavitation Guarantee**

**3.3.1 Turbine Cavitation Guarantee**

Liquidated Damages will not apply and the remedies as provided the relevant Conditions of Contract will be exercised.

## **3.4 Generator Transformer Guarantees**

**3.4.1 Generator Transformer Output Guarantee**

Liquidated Damages will not apply and the remedies as provided the relevant Conditions of Contract will be exercised.

**3.4.2 Generator Transformer Losses Guarantee**

Damages will be calculated for the generator transformer losses, taking into account the respective tolerances for accuracy.

The Contract Price will be reduced by USD 25,000 for each full 10kW of output that the measured generator transformer loss is more than the maximum guaranteed output. The figure above is based on the Employer’s energy model at mid rate tariff and discount value over the 50 year expected life of the station.

**Part 3: Schedules of prices / pricing schedules**

General Preamble

* 1. Schedules of Prices (hereinafter - S.O.P.) shall be considered in conjunction with the Instruction for bidders, General and Particular Conditions of the Contract, Employer’s Requirements and other supplementary informative documents
  2. All prices in the S.O.P. are fixed in US dollars.
  3. All prices and sums shown in the Schedules confirm that the Offeror has read all documents and agrees with all the terms, obligations and demands mentioned in the Tender Documentation...

1.4 S.O.P. shall reflect the total sum of the terms of the Contract. The price for an item that the

Contractor shows in the S.O.P.shall be the full price for completed work. The overall price shall not include any custom duties, import duties and VAT. Completed works shall include all expenses for detailed design, organization of construction plant and building process, preparation, equipment, labor, all materials and structures, additional work, use of machines , transport expenses, assembling of structures, maintenance, testing, insurance, preparation of the drawings and executive documentation, overheads, profit as well as all general risks, liabilities, obligations and full responsibility that follow the Terms of Contract and Employer’s Requirements .

* 1. The rates and values of the components shown in the S.O.P. shall include all comprehensive work according to the requirements of work production technology, building codes, regulations of technical design works and other regulatory documents. This will insure long-term, proper and safe operation and maintenance of buildings and plant and shall be defined accordingly to the following:

• Demolition work (if any): shall include dismantling by mechanical and or manual means and removal from site the non-suitable structures and materials as directed by the Engineer-In-Charge.

• Earthwork: shall include excavation of foundation, trenches, pipeline trenches at the required width and depth by mechanical and or manual means, including dressing of sides and ramming of bottoms, soil compaction, work on the ground and backfilling, including stockpiling and disposal of surplus excavated earth.

• In-situ reinforced concrete work for foundations, footings, foundation walls, pit walls: shall include earthwork (if not marked in separate columns), formworks, in-situ concrete work, steel reinforcement, and all required waterproofing.

• In-situ reinforced concrete work for columns, beams, suspended floors, slabs, straight arches and other structural elements: shall include form work, in-situ concrete work, required necessary waterproofing, steel reinforcement, anti-corrosion treatment of reinforcement structures, assembly of all joints, connections and embedded elements and shall insure all necessary proper joint work of structures during maintenance of the building, taking into consideration any possible seismic affects.

• Masonry work: shall be executed in accordance with the requirements of technical design, appropriate standards, building codes, technology requirements etc.

• Staircases and Entrance Units: shall include installation of pre-cast or in-situ reinforced concrete stairs and landings, finishes to walls, treads, risers and landings, balustrades and finishes, as well as all necessary fastenings, claddings, stainless steel railings and adjoining retaining walls, handrails, façade canopies, as well as all the necessary elements and accessories to insure the proper and safe maintenance of the facility.

• Heat-insulation: should include the arrangement of heat-insulating layer for the necessary required thickness according to heat engineering calculations, with complete sets of fastenings, fittings and joining elements.

• Metal Structures: shall include the delivery, assembling and welding of metal structures with all necessary joining elements, as well as the treatment for fireproof and rust-resistant compounds.

All work should be performed in accordance with building and technology standards and requirements.

• Installation of pre-fabricated structures: shall include all necessary sets of fastenings, fittings and joining elements.

• Roofing structures: shall include comprehensive installation of all necessary roof layers with required heat, hydro-insulation, and vapor sealing, preventive system for ice-covering, roofing materials. All work to be done in accordance with requirements for standards for building thermal physics. This work to include joining elements, all necessary elements of rainwater drainage system, snow guard and other functional and finishing elements.

• Installation of windows and doors: should include a complete assembly of windows, door and gate elements with all the required fasteners, joints, slopes, locks, fittings, All work to be completed with shutters, interior and external window sills, hardware, insect screens and built-in ventilation systems. If it is necessary, provide the cost of the automatic emergency window opening system. Windows, doors and doorways should have the necessary heat engineering requirements and also meet the requirements for heat and sound insulation.

Drywall work: shall include installation of steel stud and track for drywall framing system with soundproof filling. All to comply with standards for sound insulation, and all necessary set of fastenings, fittings and joining elements and required finishing.

• Floor structure: shall include comprehensive installation of all necessary layers for required thickness, with necessary heat, hydro and sound insulation, drainage channels, baseboards, etc.

• Interior finishing: shall be provided for all the walls, partitions, and ceiling and floor surfaces and shall include complete comprehensive set of technological processes, required for an appropriate type of finishing for certain premises and buildings.

• Facade finishing: shall include complete comprehensive set of technological processes, required by appropriate type of finishing, cladding and coating, as well as installation of all necessary facade structures, designs and accessories in order to provide long-lasting and safe maintenance of the building (This will include external fire stairs, canopy awnings, paving and other facade elements and structures).

• “Service equipment”: shall include complete set of furniture and appropriate equipment for minimum number of workplaces, special equipment for recreational, household, service and administrative buildings and premises.

• Installation of engineering systems: shall include complete range of construction work, equipment and materials with all necessary connectors, mounting, fasteners, components, installation of a complete set of pipes, fittings, valves, measuring devices and the necessary functional and technical equipment. Each engineering system includes an automatic system for control, management and regulation. The offered price for engineering systems is indicated for the complete scope of work.

• Road pavement: shall include complete range of road structure installation including the excavation, and layered filling with technologically required layers for the necessary thickness as to the intended type of road pavement, including sub-base, road base surface courses, precast concrete curbs, etc and shall ensure their durable maintenance.

• External work: shall include installation of all necessary external engineering systems and networks.

• Price for the unit of Technological Equipment shall include value for delivery and transportation of the equipment onto the construction plant and its installation. It also will include verification, fastening, casing, and connection of all components and assemblies. The provider of “technological equipment” shall provide the equipment setup, it’s launching, adjustment, and control pilot testing, and including monitoring of all communication and utility lines of intended premises and buildings.

• While determining the Value of Schedule items it will be required that the General Contractor will provide the monitoring of applied materials, products, structures and other building components. Contractors must provide control tests and analysis of incoming materials. All the specialized work relating to technological and special equipment shall be finished with its adjustment and control launch.

Mechanical plant

Mechanical plant and equipment which emits excessive noise, smoke, fumes, obnoxious gases etc., will not be allowed to be used in the site, without prior approval of the Engineer.

1.8. The rate or price should be given for every item. The price should be given for every item and the column “Sum” should be completed also.

1.9. Only the completed work submitted and then will be evaluated by the Contractor and checked by Engineer-in-Charge can submitted for request for payment.

1.10. Before starting work, Contractor shall coordinate work design documentation. Design documentation shall include, but not limited to, the following equivalent parts:

• Pre-project materials

• General and Particular Employer’s Requirements

• Instructions of products and materials manufacturers

• Standards and guidelines

• Technical specifications

• Schedules of Prices (products and materials specifications)

• Design documents (including drawings) (subject to approval by UNDP)

1.11. General description of work or its graphic image can be submitted only as part of Design documentation and cannot be submitted again. Before entering rates and prices for each unit it’s necessary to examine all the parts of design documentation.

1.12. The above information in the Preamble Document, the rates given in the S.O.P. are obligatory for all additional works.

1.13. The following units of measurement and abbreviations are used in the S.O.P.

**• Lump Sum : LS**

**1.14. Abbreviation LS (Lump Sum Price) – standard identification of “Total price”. “Total price” means the comprehensive price for the whole complete unit.**

Price Schedule Form[[2]](#footnote-2)

The Bidder is required to prepare the Price Schedule as indicated in the Instruction to Bidders.

The Price Schedule must provide a detailed cost breakdown of all goods, works and related services to be provided.

Any estimates for cost-reimbursable items, such as travel of experts and out-of-pocket expenses, should be included in the total quoted price (**i.e. the quoted total lump-sum price should be all-inclusive**).

The format shown on the following pages should be used in preparing the Price Schedule.

**General**

1. The Price Schedules are divided into separate Schedules as follows:

Schedule No. 1: Plant and equipment (including Mandatory Spare Parts)

Schedule No. 2: Detailed Design Services

Schedule No. 3: Installation, construction and Other Services

Schedule No. 4. Special Tools

Grand Summary

Schedule No. 5: Recommended Spare Parts (provisional)

2. The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer’s Requirements and other sections of the Bidding Documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.

3. If bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with instructions to bidders prior to submitting their bid.

**Pricing**

4. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialled by the Bidder.

Prices shall remain fixed and firm for the duration of the Contract.

5. Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document.

For each item, bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.

Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in volume III (Employer’s Requirements) or elsewhere in the Bidding Documents.

6. Payments will be made to the Contractor in USD currency.

7. The Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.

In addition to the spares parts identified and included in the respective Technical Specifications, the Bidder shall recommend any additional spares parts that he may deem appropriate for the long term operation and maintenance of the Works. These recommended additional spares shall be taken up at the option of the Employer. The Bidder shall list and price each separate recommended additional spare part in Schedule 5 Recommended Spare Parts. The price of recommended spare parts identified and included in the respective Technical Specifications shall not be included in the Bid Price and shall be not be considered in the financial evaluation for determining the lowest bidder.

The recommended additional spare parts should be made available upon demand, and in case required, for take up by the Employer and the price shall remain valid for a period of 24 months from the date of Bid submission.

Schedules of Rates and Prices

Schedule No. 1. Detailed Design Services

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item | Description | | Unit | Quantity | Unit Price  USD | Total Price  USD |
|  |  | |  |  |  |  |
| 1.1 | DETAILED Design  Complete Contractor’s Documents | | LS | 1 |  |  |
|  | Refer to employer requirements (volume III) for details on the scope and criteria of detailed design needed | |  |  |  |  |
|  | | TOTAL (to be carried to Grand Summary) | | | |  |

Total (in words):-------------------------------------------------------------

Bidder Name: ------------------------------------------------------------------

Bidder’s authorized person Name & title: --------------------------------------------

Authorized Signature and Co. Stamp: ------------------------------------------------------

Date: -------------------------------------------------------------------------------------

Schedule No. 2. Plant/equipment and Mandatory Spare Parts

| Item | Description | | Code1 | Unit | Quantity | Unit Price (USD) | Total price (USD) |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | |  |  |  |  |  |
|  |  | |  |  | *(1)* | *(2)* | *(1) x (2)* |
|  | **Hydro-Mechanical Plant** | |  |  |  |  |  |
|  | An overflow weir level sensors, bottom outlet gate together with all associated plant, embedded items and spares. | |  | LS | 1 |  |  |
|  | Intake Trash screens, intake gate, access platform, hoisting gantry,hand-railing and together with all associated plant, embedded items and spares. | |  | LS | 1 |  |  |
|  | Steel Penstock together with all associated plant, embedded items and spares. | |  | LS | 1 |  |  |
|  | **Mechanical & Electrical Plant** | |  |  |  |  |  |
|  | Main inlet valves including hydraulic operating mechanism and all associated equipment together with spares. | |  | LS | 2 |  |  |
|  | Turbine and governor units including all associated auxiliary equipment together with spares. | |  | LS | 1 |  |  |
|  | Power house hoisting gantry including all associated equipment together with spares. | |  | LS | 1 |  |  |
|  | Powerhouse, management house, warehouse, auxiliary systems including all associated equipment, together with spares. | |  | LS | 1 |  |  |
|  | Maintenance Workshop, equipment, tools and spares. | |  | LS | 1 |  |  |
|  | Fire detection and fighting systems for the power house and sub-station including all associated equipment together with spares. | |  | LS | 1 |  |  |
|  | Generators including excitation and all associated auxiliary equipment together with spares | |  | LS | 2 |  |  |
|  | Generator transformer including all associated equipment together with spares (2 proposed). | |  | LS | 2 |  |  |
|  | HV switch yard equipment including 11 kV Vacuum outdoor circuit breaker (VCB), line disconnect switches, CTs, VTs, and surge arrestors, together with all associated fittings, fixtures, equipment and spares. | |  | LS | 1 |  |  |
|  | Automation control components including all associated fittings, fixtures, equipment and spares. | |  | LS | 1 |  |  |
|  | Station and HV switchyard protection relay system including all associated fittings, fixtures, equipment together with spares. | |  | LS | 1 |  |  |
|  | 400 V switch boards including circuit breakers, MCB distribution and all associated equipment together with spares. | |  | LS | 1 |  |  |
|  | DC systems including power house and switchyard chargers, batteries and distribution boards, Uninterruptible Power Supply (UPS) for control system, together with all associate equipment and spares. | |  | LS | 1 |  |  |
|  | Cabling systems for the complete Works including all fixtures, fittings and spares. | |  | LS | 1 |  |  |
|  | Lighting and power outlet systems for the complete Works including all fixtures, fittings and spares. | |  | LS | 1 |  |  |
|  | Earthing and protection systems for the complete Works including all fixtures, fittings and spares. | |  | LS | 1 |  |  |
|  | Mobile phones and radios with spares | |  | LS | 1 |  |  |
|  | | **TOTAL (to be carried to Grand Summary)** | | | | |  |

Total (in words):-------------------------------------------------------------

Bidder Name: ------------------------------------------------------------------

Bidder’s authorized person Name & title: --------------------------------------------

Authorized Signature and Co. Stamp: ------------------------------------------------------

Date: -------------------------------------------------------------------------------------

|  |  |  |
| --- | --- | --- |
|  | 1 Bidders shall enter a code representing the country of origin of all plant and equipment. |  |

Schedule No. 3. Installation, civil works and Other Services

| Item | Description | Unit | Quantity | Unit Price (USD) | Total price (USD) |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |
|  | *(1)* | *(2)* | *(1) x (2)* |
|  | **Civil works** |  |  |  |  |
|  | Overflow weir & spillway structure, intake structure, including access and security lighting, fencing and landscaping. | LS | 1 |  |  |
|  | Forebay Structure including access, security lighting and fencing and landscaping. | LS | 1 |  |  |
|  | Steel penstock including, support structures, surface water drainage structures, security lighting, fencing, access walkways and landscaping. | LS | 1 |  |  |
|  | Powerhouse and tailrace structures including all building works, building services, surface and foul water drainage and oil separation facilities. | LS | 1 |  |  |
|  | Substation including all associated foundations, transformer bays, mechanical and electrical services, cable ducts, surfacing, surface water drainage, oil separation facilities, security lighting and fencing. | LS | 1 |  |  |
|  | Power station environs including multi-facility building, guard house, all building works, building services, potable water treatment facilities, surface and foul water drainage structures, access roads, signage, security lighting and fencing and landscaping. | LS | 1 |  |  |
|  | Power station main access road including surface water drainage structures and landscaping. | LS | 1 |  |  |
|  | Access roads to link all components of the new scheme including surface water drainage structures and landscaping. | LS | 1 |  |  |
|  | Powerhouse, workshop, management house, staff house, warehouse including all associated equipment/furnishing, building services, water supply and treatment system, sewage disposal system, access roads, external lighting and landscaping. | LS | 1 |  |  |
|  | **Hydro-Mechanical Plant** |  |  |  |  |
|  | Intake gate, trash screens, gantry hoist, access platforms, level sensors hand-railing together with all associated plant and embedded items. | LS | 1 |  |  |
|  | Penstock including together with all associated plant, embedded items. | LS | 1 |  |  |
|  | **Mechanical & Electrical Plant** |  |  |  |  |
|  | Intake valves including hydraulic operating mechanism and all associated equipment. | LS | 2 |  |  |
|  | Turbine and governor units including all associated auxiliary equipment. | LS | 2 |  |  |
|  | Generator including excitation and all associated auxiliary equipment. | LS | 2 |  |  |
|  | Generator transformer including all associated equipment. | LS | 1 |  |  |
|  | Powerhouse hoist including all associated equipment. | LS | 1 |  |  |
|  | Drainage system including pumps valves and all associated pipe work and equipment. | LS | 1 |  |  |
|  | Maintenance Workshop equipment and tools. | LS | 1 |  |  |
|  | Fire detection and fighting systems including all associated equipment. | LS | 1 |  |  |
|  | HV switch yard equipment including 11 kV vacuum outdoor circuit breaker (VCB), line disconnect switches, CTs, VTs, and surge arrestors, together with all associated fittings, fixtures, equipment. | LS | 1 |  |  |
|  | Automation control components, control desk including all associated fittings, fixtures, equipment. | LS | 1 |  |  |
|  | Station protection relay system including all associated fittings, fixtures, equipment. | LS | 1 |  |  |
|  | 400 V switch board including circuit breakers, MCB distribution and all associated equipment. | LS | 1 |  |  |
|  | DC systems including power house and switchyard chargers, UPS, batteries and distribution boards together with all associate equipment. | LS | 1 |  |  |
|  | Cabling systems for the complete Works including all fixtures and fittings. | LS | 1 |  |  |
|  | Lighting and power systems outlets for the complete Works including all fixtures and fittings. | LS | 1 |  |  |
|  | Earthing systems for the complete Works including all fixtures, fittings. | LS | 1 |  |  |
|  | Mobiles and radios equipment. | LS | 1 |  |  |
|  | HV substation control & monitoring system including all associated fittings, fixtures, equipment. | LS | 1 |  |  |
|  | Station protection relay system including all associated fittings, fixtures, equipment. | LS | 1 |  |  |
|  | **Training and Factory Acceptance Tests** |  |  |  |  |
|  | Training of Employer’s/beneficiary Personnel in the following key areas   * Detailed design * Procurement and logistics * Civil construction * Equipment installation * Quality control and monitoring * Commissioning and testing * Operation and maintenance   As required in the bid data sheet in volume I | LS | 1 |  |  |
|  | **Others**  **Please specify if applicable** | LS | 1 |  |  |
| TOTAL (to be carried to Grand Summary) | | | | |  |

Total (in words):-------------------------------------------------------------

Bidder Name: ------------------------------------------------------------------

Bidder’s authorized person Name & title: --------------------------------------------

Authorized Signature and Co. Stamp: ------------------------------------------------------

Date: -------------------------------------------------------------------------------------

**Schedule No. 4. Special Tools**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item | Description | Code1 | Unit | Quantity | Unit Price  USD | Total Price  USD |
| 4.1 | **Special Tools** |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  | Refer to the relevant technical specifications in the tender documents for scope of requirements |  | LS | 1 package |  |  |
|  | | TOTAL (to be carried to Grand Summary) | | | |  |

Total (in words):-------------------------------------------------------------

Bidder Name: ------------------------------------------------------------------

Bidder’s authorized person Name & title: --------------------------------------------

Authorized Signature and Co. Stamp: ------------------------------------------------------

Date: -------------------------------------------------------------------------------------

Grand Summary

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Item | Description | | | | | Total Price  USD | |
|  |  | | | | |  | |
| 1 | Total Schedule No. 1. Detailed Design Services | | | | |  | |
| 2 | Total Schedule No. 2. Plant, and Mandatory Spare Parts | | | | |  | |
| 3 | Total Schedule No.3. Installation, civil works and Other Services | | | | |  | |
| 4 | Total Schedule No. 4. Special Tools | | | | |  | |
| **Grand Total (USD) – Excluding Value Added Tax (VAT)**  **- Excluding taxes and duties** | | | | | |  | |
|  |  |  |  |  |  | |

|  |
| --- |
| Grand Total (in words):-------------------------------------------------------------  Bidder Name: ------------------------------------------------------------------  Bidder’s authorized person Name & title: --------------------------------------------  Authorized Signature and Co. Stamp: --------------------------------------------------  Date: ------------------------------------------------------------------------------------- |
|  |
|  |

**Schedule No. 5. Recommended Spare Parts**

**(not part of the total bid price)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Item | Description | Code1 | Unit | Qty. | Unit Price1 | Total Price1 |
|  |  |  |  |  |  |  |
| 5.1 | Bidder to list details and prices of other Recommended Additional Spare Parts below: |  | LS | 1 |  |  |
|  |  |  |  |  | TOTAL |  |

Total (in words):-------------------------------------------------------------

Bidder Name: ------------------------------------------------------------------

Bidder’s authorized person Name & title: --------------------------------------------

Authorized Signature and Co. Stamp: ------------------------------------------------------

Date: -------------------------------------------------------------------------------------

**Operating and Maintenance Costs**

Since the operating and maintenance costs of the facilities being procured form a major part of the life cycle cost of the facilities, these costs will be evaluated according to the principles given hereafter, including the cost of spare parts for the initial period of operation stated below and based on prices furnished by each Bidder in Price Schedule No. 1, as well as on past experience of the Employer or other Employers similarly placed.

The operating and maintenance costs factors for calculation of the life cycle cost are:

(i) Number of years for life cycle: 50 years

(ii) Operating costs and,

(iii) Maintenance costs, including the cost of spare parts for the initial 10 years period of operation,  
 iv) a rate of 8% (eight per cent) to be used to discount to present value all annual future costs calculated under (ii) and (iii) above for the period specified in (i).

Maintenance, asset disposal, training, cost of upgrades, energy consumption, resources used in manufacture and cost of duplicate service during installation are all examples of costs that could be evaluated. **If the UNDP evaluation panel finds out that the proposed equipment/plant has unreasonably high Operating and Maintenance Costs, then UNDP reserves the right to ask the bidder, whose offer is being evaluated, to propose an alternate plant/equipment with reasonable and acceptable Operating and Maintenance Costs, but without changing his bid price. The UNDP assigned project technical committee will ensure selecting plant/equipment which proves to be the lowest in total cost of ownership**. **In this regard, UNDP reserves the right to reject any proposals if the rsepctive bidder fails or declines to propose alternate** **plant/equipment with reasonable and acceptable Operating and Maintenance Costs (with reference to the applicable Standards & Norms).**

**Price Breakdown by Cost Component:**

The Bidders are requested to provide the price breakdown for the above given prices for each deliverable (LS). UNDP shall use the price breakdown for the price reasonability assessment purposes as well as the calculation of price in the event that both parties have agreed for additional set of goods, works and/or related services.

Personnel (professional staff) cost

Labor cost

Materials cost

Equipment cost

Overhead

Profit

Other expenses

The bidder can include the cost components he deems necessary for proper showing of his price structure.

**Terms and Procedures of Payment**

The Employer shall pay the Contractor in the following manner and at the following times, on the basis of the Price Breakdown given in the section on Price Schedules. Payments will be made in the currencies quoted by the Bidder. Applications for payment in respect of part deliveries may be made by the Contractor as work proceeds.

**TERMS OF PAYMENT**

Schedule No. 1. Detailed Design.

In respect of design services the payments shall be made as follows:

* + 1. Advance payment at 15% of the design costs
    2. Submission of basic design - 15%
    3. Submission of detailed design - (70%)

Schedule No. 2. Plant and Equipment Supplied

In respect of plant and equipment supplied, the following payments shall be made:

Fifteen percent (15%) of the total DAP (exclusive of domestic taxes) amount as an advance payment against receipt of invoice and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer.

Seventy-five percent (75%) of the total or pro rata DAP (exclusive of domestic taxes) amount upon *Incoterm* “DAP,” upon delivery to Site within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata DAP (exclusive of domestic taxes) amount upon issue of the Completion Certificate, within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata DAP (exclusive of domestic taxes) amount upon issue of the Operational & final Acceptance Certificate, within forty-five (45) days after receipt of invoice.

Schedule No.3\_\_\_\_ Installation, civil works and Other Services

In respect of installation& civil works services, the following payments shall be made:

Fifteen percent (15%) of the total installation & civil works services amount as an advance payment against receipt of invoice, and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer. The advance payment security may be reduced in proportion to the value of work performed by the Contractor as evidenced by the invoices for installation services.

Seventy-five percent (75%) of the measured value of work performed by the Contractor, as identified in the said Program of Performance, during the preceding month, as evidenced by the Employer’s authorization of the Contractor’s application, will be made monthly within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata value Installation & civil works services performed by the Contractor as evidenced by the Employer’s authorization of the Contractor’s monthly applications, upon issue of the Completion Certificate, within forty-five (45) days after receipt of invoice.

Five percent (5%) of the total or pro rata value of Installation & civil works performed by the Contractor as evidenced by the Employer’s authorization of the Contractor’s monthly applications, upon issue of the Operational & final Acceptance Certificate, within forty-five (45) days after receipt of invoice.

Schedule No. 4. Special Tools.

In respect of special tools, the following payments shall be made:

Fifteen percent (15%) of the total DAP (exclusive of domestic taxes) amount as an advance payment against receipt of invoice and an irrevocable advance payment security for the equivalent amount made out in favor of the Employer.

Eighty five percent (85%) of the total or pro rata DAP (exclusive of domestic taxes) amount upon *Incoterm* “DAP,” upon delivery to Site within forty-five (45) days after receipt of invoice.

PAYMENT PROCEDURES

The procedures to be followed in applying for certification and making payments shall be as follows:

*The contractor shall submit invoices that shall be certified by the Project Manager. The certified invoices shall be submitted for payment by the Project Manager and payment shall be as detailed above. The invoices shall be accompanied with appropriate forms and certificates annexed by the Employer in the bidding documents.*

Price Adjustment

Not Applicable. The contractor prices shall remain firm and fixed for the whole duration of the Contract (and any future time extensions to the contract if it occurs)

1. [] Details of further sections of penstock to be added as necessary. [↑](#footnote-ref-1)
2. *No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Bid.* [↑](#footnote-ref-2)