**ANNEXURE - A**

**List of attachments**

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Annexures** | **Particular of the Attachment** |
| 1 | Annexure: 1 | Summary of Contractor’s Work Experience. |
| 2 | Annexure: 2 | Details of experience in Wind-Power for each Wind Power Plant. |
| 3 | Annexure: 3 | Details of Quoted model(s) of WTG. |
| 4 | Annexure: 4 | List of Windmills installed. |
| 5 | Annexure: 5 | Proforma for Exceptions & Deviations. |
| 6 | Annexure: 6 | Work Sheet for guaranteed annual Wind Energy output. |
| 7 | Annexure: 7 | Technical Particulars of WTGs to be furnished by Contractor(s). |
| 8 | Annexure: 8 | Technical Particulars of Transformer to be furnished by Contrator(s). |
| 9 | Annexure: 9 | Technical Particulars of CB to be furnished by Contractor(s). |
| 10 | Annexure: 10 | Source of components to be furnished by Contractor(s). |
|  | Attachments without any specified standard format |
| 11 | Annexure: 11 | List of Plant & Machinaries. |
| 12 | Annexure: 12 | List of routine tests for all processes ie. Manufacturing, Supply, Erection,Testing and Commissioning etc. |
| 13 | Annexure: 13 | Contractor’s other conditions if any. |
| 14 | Annexure: 14 | List of components( if any) with life less than 20 years. |
| 15 | Annexure: 15 | Any other( than above) drawings/details.  |

***Annexure: 1***

##### S**ummary of work experience**

1. **Summary of list of works completed in the last three financial years as on date of submission of contractor**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.** | **Description of the Work** | **Contract** | **Contract** | **Date of** | **Date of** | **Date of** | **Actual** | **Final Value** |
| **No** | **& contract No.** | **Awarded by** | **Value** | **contract** | **completion** | **commence** | **completion** | **of Contract** |
|  |  |  |  | **awarded** | **as per** | **ment of** | **Date** |  |
|  |  |  |  |  | **agreement** | **work** |  |  |
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1. **Summary of works on hand**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No.** | **Description of Work & contract no.** | **Contract Value** | **Date of contract awarded** | **Approximate value of Balance work yet****to be done** |
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**NOTE:**

1. Supportive documents/ certificates from the Organizations with whom they worked/ are working should be enclosed.
2. Certificates from private individuals for whom such works are executed/ being executed shall not be accepted.

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***Annexure: 2***

**Proforma for details of experience in wind power based project in last three years as on date of submission of contractor**

**(Separate Sheet for each Wind Power Plant)**

|  |  |
| --- | --- |
| **Sl.No.** | **Description** |
| 1 | Name of works, Buyer's address and contact person with Telephone Number |
| 2 | Detailed scope of Work |
| 3 | Type of Plant & Machines used (only for major components) |
| 4 | Capacity of the Plant, No. of WTGs with capacity and height of Tower |
| 5 | Whether O & M is being looked after, period of O&M Contract |
| 6 | Completion time as per contract |
| 7 | Actual completion time and year of completion |
| 8 | Reasons for delay, if any |
| 9 | Period of successful operation |
| 10 | Copy of work order, completion certificate and satisfactory performance certificate fromthe clients for the above mentioned work are enclosed |
| 11 | Actual generation achieved per machine per year (month-wise) |
| 12 | Generation offered per year against actual generation achieved per machine at the time of taking order. |
| 13 | Additional information, if any, |

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**Note:** The Contractor shall furnish documentary evidence such as copies of award of contract, completion/ performance certificate from clients/ customers, in support of the above stipulated technical details of experience along with bid document.

***Annexure: 3***

### List of windmills installed (for quoted model(s) only)

##### Working at least since Last five year’s as on date of submission of tender.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Commissioning** | **Type of** | **No.Of** | **Total** | **Place** | **Buyer's** | **Total** |  |
|  | **M/c.** | **M/c** | **capacity** |  | **Name** | **Generation** |  |
|  |  |  |  |  |  | **in kWh for****the last** | **Approval****ref.** |
| **Month** | **Year** |
|  |  |  |  |  |  |  | **year** |  |
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**Note:** The Contractor shall furnish documentary evidence such as copies of award of contract, completion/ performance certificate from clients/ customers, in support of the above stipulated technical details of experience, along with bid document.

***Annexure: 4***

### List of windmills installed by the contractor

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Commissioning** | **Type of M/c.** | **No.Of M/c** | **Total capacity** | **Place** | **Buyer's Name** | **O&M Contract period** |
| **Month** | **Year** | **From** | **To** |
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**Note:** The Contractor shall furnish documentary evidence such as copies of award of contract, completion/ performance certificate from clients/ customers.

***Annexure: 5***

**Proforma for exceptions and deviations**

The Contractor is required to stipulate the list of exceptions & deviations, if any, in the proforma given below only: any deviations given elsewhere in the offer will not be considered

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No** | **Description of section of Contract/ Page No.** | **Clause No.** | **Exceptions &****Deviations with justification** |
|  |  |  |  |
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***Annexure: 6***

###  Worksheet for guaranteed annual wind energy output

**(For the quoted model(s) only)**

### Micrositing report should be attached

Model of WTG offered :---------

Capacity of each WTG( in kW) :---------

No. of WTG’s offered :---------

##### Micrositing report should contain:

* + 1. Joint frequency distribution data of the proposed site (wind Data).
		2. Digitized Contour map of the proposed site.
		3. Power & Thrust curve of the proposed machine.
		4. Details of the software used for energy estimation.
		5. Estimated energy from machines.
		6. All other details if any.

##### Soft copies (CD) of all required inputs also should be given for verification purpose.

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***Annexure: 7***

**Technical particulars of quoted model of WTGs.**

|  |
| --- |
| **General Data** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make of WTG |  |
| 2 | Type |  |
| 3 | Rated output |  |
| 4 | Current (Amps) |  |
| 5 | Voltage (V) |  |
| 6 | Voltage Variation (%) |  |
| 7 | Frequency Variation (%) |  |
| 8 | Asymmetry variation (%) |  |
| 9 | Wind Speed at rated output (m/ Sec) |  |
| 10 | Cut in wind speed (m/sec) |  |
| 11 | Cut out wind speed(m/sec) |  |
| 12 | Tip speed (m/sec) |  |
| 13 | Survival wind speed (m/sec) |  |
| 14 | Hub height(m) |  |
| 15 | Rotor speed (rpm) |  |
| 16 | Nacelle tilt angle |  |
| 17 | Regulation |  |
| 18 | Designed max temp (deg C) |  |
| 19 | Designed life (years) |  |
| 20 | Designed turbulence intensity |  |
| 21 | Noise level (dB) (also specify distance) |  |
| 22 | Frequency (Hz) |  |
| 23 | Maximum designed rotor speed |  |
| 24 | Pitch angle for stall regulated machine |  |
| 25 | Rotor orientation (upwind /downwind) |  |
| 26 | No. of blades |  |
| 27 | Rotor diameter (m) |  |
| Sl. No | Description | Particulars |
| **Weight** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Rotor (kg) |  |
| 2 | Nacelle (kg) |  |
| 3 | Tower (kg) |  |
| 4 | Total (kg) |  |
| **Generator** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Rated power output (kw) |  |
| 3 | Type – Asynchronous/ synchronous. Or Other (please specify) |  |
| 4 | Voltage / RPM |  |
| 5 | No. of poles |  |
| 6 | Insulation Class |  |
| 7 | Protection class |  |
| 8 | Coupling |  |
| 9 | Current Amps. |  |
| 10 | Frequency |  |
| 11 | Dual speed/Variable speed |  |
| 12 | Type of cooling |  |
| 13 | **If forced cool then** |  |
| *A* | *Type & quantity of coolant* |  |
| *B* | *Pump rating* |  |
| *C* | *Motor make & rating* |  |
| *D* | *No. of phase* |  |
| *E* | *Motor duty cycle* |  |
| **Rotor** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Blade Material |  |
| 3 | Number of blades |  |
| 4 | Rotor diameter (m) |  |
| 5 | Swept area(Sq.m) |  |
| 6 | Length of blade(m) |  |
| 7 | Specification (TUD profile) |  |
| 8 | Blades profile |  |
| 9 | Weight of each blade |  |
| 10 | Ref. Standards, Ref. No., Date of issue, Name of Authority |  |
| 11 | Lighting protection for blades |  |
| **Tower** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Height |  |
| 3 | Type(Tubular/ Lattice) |  |
| 4 | Material |  |
| 5 | No. of Sections |  |
| 6 | Assembly |  |
| 7 | Ladder type |  |
| 8 | Safety system |  |
| 9 | Surface treatment protection |  |
| 10 | No. & type of landing platforms |  |
| 11 | Type of reptile protection |  |
| **Yawing System** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make & Type |  |
| 2 | Gear box ratio |  |
| 3 | Rated capacity of yaw motor |  |
| 4 | No. of Yaw motors |  |
| 5 | Type of Yaw brake |  |
| 6 | No. of Yaw brake |  |
| **Braking System** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Aero-dynamic |  |
| *A* | *Type* |  |
| *B* | *Control* |  |
| 2 | Mechanical or Other Type |  |
| *A* | *Make & Type* |  |
| *B* | *Position* |  |
| *C* | *No. of Calipers* |  |
| *D* | *Motor Capacity (kW)* |  |
| **Gear Box** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Type/Model |  |
| 3 | Gear ratio |  |
| 4 | No of stages |  |
| 5 | Max. power transimission (kW) |  |
| 6 | Lubrication System |  |
| 7 | Designed life |  |
| 8 | Type of oil |  |
| 9 | Weight without oil (kg) |  |
| 10 | Quantity of oil |  |
| **Hub** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make & Type |  |
| 2 | Material |  |
| **Main Shaft** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make & Type |  |
| 2 | Material |  |
| **Main Bearing** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Type & Specification |  |
| **Coupling** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Type & Specification |  |
| **Nacelle** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Material |  |
| 2 | Type of nacelle bed |  |
| 3 | Facility of loading & unloading |  |
| 4 | Lighting protection |  |
| **Power Factor Compensation Capacitors** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Make |  |
| 2 | Type |  |
| 3 | Capacity (kVAR) |  |
| 4 | Number |  |
| 5 | No. of Steps |  |
| 6 | Designed life of capacitors |  |
| 7 | Current in Amps. |  |
| 8 | Rated voltage |  |
| 9 | Estimate kVARh concumption as percentage of annual kWh generation |  |
| 10 | Power factor at different loads after Compensation loads after compensation: |  |
|  | * *No load*
 |  |
|  | * *25% load*
 |  |
|  | * *50% load*
 |  |
|  | * *75% load*
 |  |
|  | * *100% load*
 |  |
| **Power Control Cubicle (PCC) Panel** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Voltage |  |
| 2 | Short circuit level |  |
| 3 | Rating of main MCCB |  |
| 4 | Provision for earth fault protection |  |
| 5 | Dimension |  |
| 6 | Relavant standards |  |
| **Control System** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Type |  |
| 2 | List of display (kindly attach separate sheet)  |   |
| 3 | List of error messages (kindly attach separate sheet) |  |
| 4 | List of annunciation (kindly attach separate sheet) |  |
| 5 | Stop Features |  |
| 6 | Remote Contyrol Facility |  |
| 7 | Printer Facility |  |
| 8 | Details of Special accessories (Like laptop, computer) for retrieval of parameters including power curve data |  |
| **Details of CMCS** |
| **Power cable (between generator & power panel)** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Type & Make |  |
| 2 | Conductor material |  |
| 3 | Conductor size |  |
| 4 | No of core |  |
| 5 | Ref. standard |  |
| **ISO 9001 Certification** |
| **Sl. No** | **Description** | **Particulars** |
| 1 | Category of certification |  |
| 2 | Date of certification |  |

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***Annexure: 8***

**Technical data sheet of transformer**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Description** | **Technical Particulars** |
| 1 | Make |  |
| 2 | Rating |  |
| 3 | Design ambient Temp. |  |
| 4 | Rated HV/LV winding Voltage kV |  |
| 5 | Vector group **:** |  |
| 6 | Type of cooling **:** |  |
| 7 | Tapping Details **:** |  |
| 8 | % Impedence **:** |  |
| 9 | 1. Impulse withstand Voltage
2. Power frequency withstand voltage for one minute (dry)
 |  |
| 10 | Winding conductor material |  |
| 11 | Losses (at 75 Deg. C and principal Tapping)1. Iron losses in kW at rated voltage and frequency
2. Copper losses in kW at rated full load current and frequency at 75 deg. C

IS Tolerance is applicable for above |  |
| 12 | Efficiency at 75 Deg. C and 0.9 PF **:** |  |
| 13 | Details of Instruments and protection provided with the transformer (Make & Type) |  |

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***Annexure: 9***

### Technical data sheet of vacuum circuit breakers

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **Particulars** | **Technical Particulats** |
| 1 | Make & Type |  |
| 2 | Rated voltage (kV) |  |
| 3 | No. of poles of circuit breaker |  |
| 4 | Type of operating mechanism |  |
| 5 | Rate of contact travel |  |
| 6 | Number of break per phase |  |
| 7 | Control voltage for close/trip ckt |  |
| 8 | Circuit breaking capacity (kA) |  |
| 9 | Making capacity, kA (peak) |  |
| 10 | Short Circuit withstand capacity |  |
| 11 | Total Break time |  |
| 12 | Make time & Arching Time |  |
| 13 | Dead time for 3 phase re-closing |  |
| 14 | Operating time |  |
| 15 | Insulation level |  |
| 16 | Impulse withstand Voltage |  |
| 17 | Weight of Vacuum circuit breaker |  |
| 18 | Overall dimensions |  |

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***Annexure: 10***

## Source of components

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.** | **Item Description** | **Make** | **Model** | **Source/ Country** |
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**ANNEXURE B**

**GUARANTEED PARAMETERS FOR MACHINE PERFORMANCE**

**1 This clause sets out:**

a. the performance guarantee parameters.

b. the preconditions to the validity of the performance guarantees in production as set forth below.

c. the minimum level of the performance guarantees.

d. the procedure for conducting the performance guarantee tests, recording of measurements / results and calculation for deriving the test results.

e. formula for calculation of liquidated damages for failure to attain the performance guarantees.

**2 Pre-conditions**

The Contractor gives the Performance guarantees for the WTGs. The contractor has to vet the demonstrated power curve results of the selected WTGs at site conditions

2.1 Performance Guarantee Parameters

Subject to compliance, the Contractor guarantees as follows:

2.1.1 Power Curve Generation Guarantee (PCGG)

1. The annual energy output shall be calculated using the software.
2. The annual energy output in kWh shall be evaluated and validated by authorized agency.

2.1.2 To assess/verify feasibility of quoted PCGG by the contractor, certified curve of respective machines will be considered.

 **3 Failure in guarantees and liquidated damages**

1.3.1 Failure to Attain Power Curve Generation Guarantee (PCGG)

1.3.1.1For any shortfall in PCGG during the warranty/defects liability period, the liquidated damages not by way of penalty shall be recovered from Contractor as described below:

* For failure to achieve the estimated power generation as per power curve & wind data as per wind mast, liquidated damages (not by way of penalty) of 0.5% of total contract price shall be levied for each 0.5% or part thereof shortfall in generation subject to maximum of 7.5% of the contract price.

**4 Machine availability guarantee**

1. For all aspects relating to grid availability of less than 95% if any, due credit in form of Full hours will be allowed.
2. The Contractor shall offer a minimum machine availability guarantee for the complete 10 year period. The availability shall be monitored for the first major wind period following the commissioning and handing over.
3. Machine Availability Factor (MAF) is defined as the relative time where the WTGs operates or is ready to operate.
4. The Contractor shall guarantee that the annual Machine Availability Factor shall not be less than 95% for entire wind power plant, during every year of the warranty period as well as every year during the period under O&M contract. The availability factor will be calculated as per the formula given below:
5. "Machine Availability" shall mean the ratio of actual number of annual hours for which the WTG are in. a state of complete readiness to generate Power subject to the Grid availability, wind availability and all other parameters referred hereunder, to the total number of hours available annually (i.e. 8760 Hours). Machine Availability shall be calculated as follows.

$$\% Machine Availability \left(MAF\right)=\frac{\left[\left(No of machines\right)\* \left(Recorded Hours\right)\* 100\right]}{\left[\left(No of machines\right)\* \left[8760 - \left(GF + FM\right)\right]\right]}$$

Where, Recorded Hours = [8760- (GF + FM + S +U)]

8760 = Number of total hours for a machine in an year (i.e. 24 x 365 Days)

GF = Grid Failure hours

FM. = Force Majeure hours

S = Scheduled Maintenance Hours for a machine

U = Breakdown Maintenance Hours for a machine

1. Although the machine availability is to be calculated annually, it may be noted that no breakdown or non-operating condition of WTG should last for more than 7 calendar days, including a part of the day on which the machine fails/ put back into service. If any breakdown / non – operating condition extend for more than 7 days, then the machine availability factor shall be counted individually for each machine on monthly basis and not on annual basis. The minimum bench mark of 95% machine availability shall be applicable on monthly basis for individual machine and it shall be counted from 1st of calendar month in which the stoppage has occurred.

For this purpose the Machine Availability shall be calculated from 8th calendar day as follows

$$\% Machine Availability \left(MAF\right) (Monthly Basis)=\frac{\left[\left(No of machines\right)\* \left(Recorded Hours\right)\* 100\right]}{\left[\left(No of machines\right)\* \left[(24\*31) - \left(GF + FM\right)\right]\right]}$$

Where, Recorded Hours = [(24x31)- (GF + FM + S +U)]

24x31 = Number of total hours for a machine per month

GF = Grid Failure hours

FM. = Force Majeure hours

S = Scheduled Maintenance Hours for a machine

U = Breakdown Maintenance Hours for a machine

**1.5 REACTIVE POWER DRAWAL**

The reactive power drawn shall not exceed 5% of the active power exported on monthly basis

**1.6 INTERNAL LOSSES**

The Contractor shall provide efficient transformers and associated electrical systems for limiting the losses from the WTG controllers to the metering point of GEA. The internal losses on annual basis shall be less than 3%.